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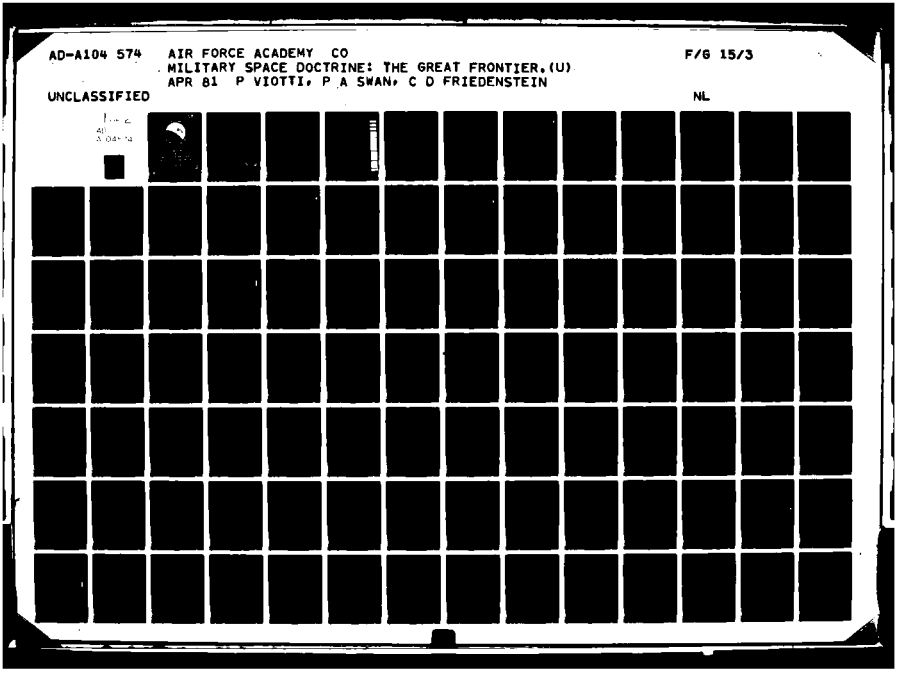

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# THE FINAL REPORT FROM THE UNITED STATES AIR FORCE ACADEMY MILITARY SPACE DOCTRINE SYMPOSIUM

## 1-3 APRIL 1981

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# MILITARY SPACE DOCTRINE:

# THE GREAT FRONTIER.

The Final Report for

the USAFA Military Space Doctrine

Symposium, 1-3 April 1981


Editor: Major Paul Viotti

Associate Editors: Major Peter A. Swan
Major Charles D. Friedenstein

Coordinators: Panel I - Major Carl C. Schade
Panel II - Major Charles J. Yoos
Panel III - Captain Jerome V. Martin

Chairman of Space
Doctrine Group : Lt Col Thomas J. Eller



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## Dedication

This final report is a direct result of a major challenge to the Academy by Dr. Hans Mark (Jan 1980). We chose to pick up the baton and work within the Air Force to stimulate thought on the military space program. Dr. Mark's vision and understanding enabled this effort to succeed.

## Acknowledgement

The symposium sponsors are grateful for financial assistance received from the Association of Graduates of the United States Air Force Academy, made possible by an unrestricted grant from Major General Wendel B. Sell. (USAF, Ret.).

## Security Statement

The symposium was conducted at the unclassified level. This final report is UNCLASSIFIED.

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The report presents the consensus of 246 leaders of the Air Force space program to questions posed to them in three areas: United States space operations doctrine, United States space organization doctrine, and International/USSR space operations and organization doctrine. Within each of these areas, discussion is divided between the past, the present (1975-1985) and the future (post 1985).

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# Introduction

# INTRODUCTION

During his January 1980 visit to the United States Air Force Academy Dr. Hans Mark, then Secretary of the Air Force, issued a challenge that we apply our spectrum of academic expertise to the study of a doctrine for the military role in space. Our response to this challenge was to establish a working group with expertise in astronautics, management, political science, history, and doctrinal development. After spending months researching the many issues bearing on space doctrine, two major actions were taken in 1981: an interdepartmental special topic course in space doctrine was organized and taught to cadets during the spring 1981 semester and the USAFA Military Space Doctrine Symposium was convened in early April 1981.

The purpose of the symposium was to evoke discussion on the past, present, and future aspects of military space doctrine. Detailed objectives were to make present and future leaders aware of the need for a military space doctrine. In addition to disseminating information on these issues to Air Force officers and cadets, the latter were also allowed to enroll in the space doctrine course and thus participate with Air Force officers working space issues.

To challenge the symposium participants, five individuals were invited to deliver major addresses. General Bernard Schriever (USAF, Retired) addressed 900 cadets on Wednesday evening, 1 April. This address was open to the general public. General Schriever also opened the symposium Thursday morning. Major General I. B. Holley (USAF Reserve, Retired), now a professor of history at Duke University and a noted authority on military doctrine and history, spoke on lessons from past developments in military

doctrine. Dr. Mark addressed the group at the Thursday night banquet and Lt General Richard C. Henry, Commander of Space Division, opened the Friday session. Finally, Dr. Charles W. Cook, Deputy Assistant Secretary of the Air Force for Space Plans and Policy, spoke at Friday's lunch.

To encourage a free and open exchange of ideas, several modifications were made to the usual symposium format. Solicited papers were published in a four volume set (The Great Frontier: A Book of Readings for the USAFA Military Space Doctrine Symposium) and distributed one month prior to the symposium. Only those papers dealing with space doctrinal issues were accepted for publication. All were disseminated to symposium participants, allowing them to make their own judgments on the relative merits of the ideas presented. To maximize discussion time during the sumposium, roundtable conferences were held in lieu of formal paper presentations.

Three roundtable panels were organized: U.S. Space Operations Doctrine, U.S. Space Organization Doctrine, and USSR/International Space Operations and Organization Doctrine. Three meetings of each roundtable were held to discuss the history, the present (1975-1985), and the long-range future (post-1985) of assigned topics. The roundtables were each led by a panel of three distinguished guests, chosen for their expertise on the roundtable topic. An Academy faculty member served as a coordinator for discussions. Because the three roundtables met simultaneously, all symposium participants reconvened for plenary sessions to hear summaries of the roundtables they missed. (see figures 1, 2, and 3).

As has been true in the development of air doctrine, discussions on space doctrine will undoubtedly continue for may years. Given the need

for further development and understanding of space doctrinal matters, the Academy will remain available to support subsequent efforts of this kind. In this regard, the 1981 USAFA Military Space Doctrine Symposium was only a first step in what will be a continuing process of doctrinal development.

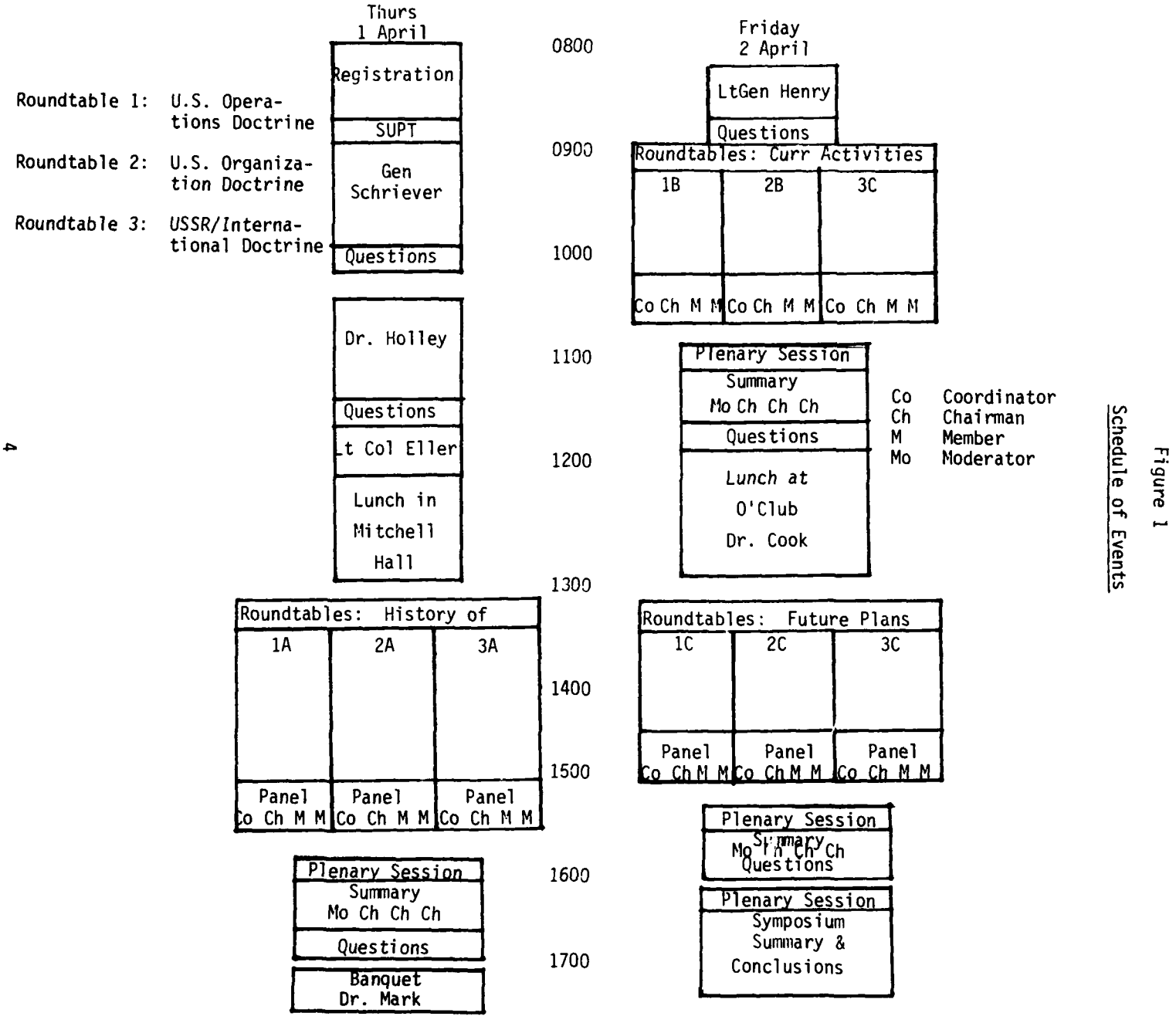


Figure 1

Schedule of Events

Figure 2

Organization of Roundtables

ROUNDTABLE PANEL 1

U.S. Space Operations Doctrine

Chairman - Maj Gen John E. Kulpa, Jr., Deputy Commander for Space Operations, Los Angeles Air Force Station

Members - Brig Gen Thomas C. Brandt, HQ Aerospace Defense Command, Cheyenne Mountain

- Col Joe E. Sanders, Commander, AF Satellite Control Facility

Coordinator - Maj Chris Schade, Department of Astronautics and Computer Science, USAF Academy

ROUNDTABLE PANEL 2

U.S. Space Organization Doctrine

Chairman - Brig Gen Robert A. Rosenburg, Assistant Chief of Staff for Studies and Analysis, HQ USAF

Members - Brig Gen William L. Shields, Jr., Deputy Chief of Staff for Space Surveillance and Warning Systems, HQ SAC

Brig Gen Ralph H. Jacobson, Director of Space Systems and Command, Control, and Communications, HQ USAF

Coordinator - Maj Charles Yoos, Department of Economics, Geography and Management, USAF Academy

ROUNDTABLE PANEL 3

USSR/International Space Operations and Organization Doctrine

Chairman - Maj Gen George J. Keegan, Jr. (USAF, Ret)

Members - Dr. Anthony J. Cacioppo, Chief Scientist, Foreign Technology Division

- Dr. Charles S. Sheldon, II, Senior Specialist in Space and Transportation Technology, Congressional Research Services, Library of Congress

Coordinator - Capt Jerry Martin, Office of Deputy Commandant for Military Instruction, USAF Academy

Figure 3

Detailed Schedule of Events

UNITED STATES AIR FORCE ACADEMY

MILITARY SPACE DOCTRINE SUMPOSIUM

1 -3 APRIL 1981

WEDNESDAY, 1 APRIL 1981

| | | |
|---|---|---|
| TBD | Bus pickup for Military Air flights | |
| 1930 | Bus pickup at Ramada Inn (RI) | |
| 1940 | Bus pickup at VOQ | |
| 2000 | Address to portion of the Cadet Wing | Arnold Hall |
| | Welcome: Lt General K.L. Tallman, Superintendent, USAF Academy | |
| | Speaker: Gen Bernard Schriever, (USAF, Ret) | |
| | "The Hisotry of the AF in Space: | |
| 2100 | Bus pickup at Arnold Hall for Officer's Club and RI | |
| 2100 | No-host cocktails | Officers' Club |
| 2230 | Bus pickup at Officers' Club for RI | |

THURSDAY, 2 APRIL 1981

| | | |
|---|---|---|
| 0630 | Dining Room open for breakfast (optional) | Officers' Club |
| 0700 | Breakfast Meeting | Offecers' Club |
| | Panel Chairmen and Members with symposium staff (Falcon Room) | |
| 0715 | Bus pickup at RI for Fairchild Hall | |
| 0730 | Bus pickup at VOQ/Officers' Club for Fairchild Hall | |
| 0745 | Conference Registration | Fairchild Hall H-1 |
| | Continental breakfast served in conference area included in registration fee | |
| 0810 | Movie: (optional) A tour of the Delta Class Cruiser "INTREPID" in the year 2076 | |
| 0830 | Opening: Maj Chuck Friedenstein Symposium Director | Fairchild Hall H-1 |
| 0835 | Welcome: Lt General K.L. Tallman, Superintendent USAF Academy | H-1 |
| 0845 | Symposium Speaker: Gen Bernard Shriever, (USAF, Ret) | |
| 0945 | Questions from the floor | |
| 1000 | Coffee break | |

| | | |
|---|---|---|
| 1015 | "Historical Perspective of Military Doctrine"<br>Dr. I.B. Holley, Jr.<br>Introduction: Col P.D. Caine<br>Deputy Commandant for Military Instruction Member, Symposium Steering Committee | H-1 |
| 1115 | Questions from the floor | |
| 1130 | Symposium Goals and Organization<br>LtCol Thomas J. Eller<br>Professor and Head<br>Department of Astronautics and Computer Science<br>Chairman, Symposium Steering Committee | H-1 |
| 1145 | Panel Member Introductions and residual roundtable sign-ups | H-1 |
| 1200 | Cadet Lunch Formation Review | Eagle and Fledglings |
| 1220 | Lunch with Cadet Wing<br>(cost collected at registration)<br>Dress: Uniform of the Day | Mitchell Hall |
| 1315 | Round Table Seminars - History of | |
| | 1A U.S. Space Operations Doctrine | H-1 |
| | 2A U.S. Space Organization | L-6 |
| | 3A USSR/International Space | L-8 |
| | Introduction of Roundtable Concept and Panel members by Panel Coordinator<br>Kick off by panel members<br>Open discussion | |
| 1530 | Coffee break | |
| 1600 | Summary of Roundtables 1A, 2A, and 3A<br>Discussion by Panel Chairman to Symposium Participants on question consensus<br>Summary Moderator: LtCol C.W. Reddel<br>Professor and Head<br>Department of History<br>Member, Symposium Steering Committee | H-1 |
| | Questions from the floor | |
| 1645 | Bus pickup at Fairchild Hall for VOQ and RI | |
| 1830 | Bus pickup at RI for Officers' Club | |
| 1845 | No-host cocktail party | Officers' Club |
| 1930 | Banquet<br>(cost collected at registration)<br>Master of Ceremonies: LtCol Thomas J. Eller<br>Speaker: Dr. Hans Mark<br>Dress: Coat and Tie | Officers' Club |
| 2200 | Bus pickup at Officers' Club for RI | |

FRIDAY, 3 APRIL 1981

| | | |
|---|---|---|
| 0630 | Breakfast (optional) | Officers' Club |
| 0715 | Bus pickup at RI for Fairchild Hall | |

| | | |
|---|---|---|
| 0730 | Bus pickup at VOQ for Fairchild Hall<br>Continental breakfast at conference area<br>(included in the registration fee) | |
| 0755 | Movie: (optional) Space - The New Ocean | Fairchild Hall<br>H-1 |
| 0800 | Opening: Maj Chuck Friedenstein<br>Morning Speaker<br>Lt Gen Richard Henry, Commander Space Division | |
| 0830 | Questions from the floor | |
| 0845 | Round Table Seminars -<br>Current activities (1975-1985) | |
| | 1B U.S. Space Operations Doctrine | H-1 |
| | 2B U.S. Space Organization | L-6 |
| | 3B USSR/International Space | L-2 |
| | Kickoff by panel members<br>Open Discussion | |
| 1030 | Coffee Break | |
| 1100 | Summary of Roundtables 1B, 2B, 3B<br>Discussion by Panel Chairman to Symposium<br>Participants on question consensus<br>Summary Moderator: Capt Cathy W. Swan<br>Asst Prof of Management<br>Department of Economics,<br>Geography and Management<br>Member, Symposium<br>Committee<br>Questions | H-1 |
| 1130 | Bus pickup at Fairchild Hall for Officers' Club | |
| 1145 | Lunch<br>(Cost collected at registration)<br>Master of Ceremonies: Maj Peter A. Swan<br>Course Director<br>Astronautics 495<br>Speaker: Dr. Charles W. Cook<br>Deputy Assistant<br>Secretary of the Air Force<br>Space Plans and Policy | Officers' Club |
| 1300 | Bus pickup at Officers' Club for Fairchild Hall | |
| 1315 | Roundtable Seminars - Future Plans (1985 +) | |
| | 1C U.S. Space Operations, Doctrine | H-1 |
| | 2C U.S. Space Organization | L-6 |
| | 3C USSR/International Space | L-2 |
| | Kickoff by panel members<br>Open Discussion | |
| 1500 | Coffee Break | |
| 1530 | Summary of Roundtables 1C, 2C, and 3C<br>Discussion by Panel Chairmen to Symposium<br>Participants on question consensus<br>Summary Moderator: LtCol C.G. Cook<br>Professor and Head<br>Department of Political<br>Science<br>Member, Symposium<br>Steering Committee<br>Questions from the floor | H-1 |

1600 Coffee Break
1615 Symposium Summary H-1
Moderator: LtCol Thomas J. Eller
Steering Committee Chairman
1715 Adjourn
1730 Bus pickup at Fairchild Hall to VOQ and RI

SATURDAY, 4 APRIL 1981

TBD Bus pickup at VOQ and RI for Mil Air flights
1000 Bus pickup at VOQ for breakfast at RI and return to VOQ (Officers' Club dining room is closed until 1800)

Bus transportation is provided to and from the VOQ, the Ramada Inn, and scheduled activities. If you miss the bus for any reason, call base transportation at 472-2230 and you will be transported on a first come-first served-as available basis.

# Foreword

## FOREWORD

Military Space Doctrine--The Great Frontier. Is this slogan a presumptuous overstatement of the case? We think not. Man has always sought to expand his domain. In subduing the earth, man moved onto the water, under the water, into the air, and into space as technology allowed. With him, man took all of his ways--the good and the bad. Onto the seas and into the air, man took war. If history is any guide, the domain of war will undoubtedly extend to space as well. Accordingly, military strategists need to develop the doctrine that will guide military force employment in space, should such a contingency arise.

The nations that could define their goals and marshall their resources controlled the seas and altered the course of human history. The nation that controls space gains political leverage, if not control on the earth, and will again be in a position to alter the course of history. We stand at the threshold of the space age, but we stand here with no clear plan for the future. In our society we believe and practice civilian control over the military. We believe that when called upon for advice, the military should provide the civilian authorities a clear statement of the best military solution. Can we speak with convincing certainty today? Do we have a military space doctrine--a collection of beliefs that guide our thoughts, or do we merely have twenty years of man in space?

Our military space program has consistently explored the new ground in space. We launched our country's first satellite and developed the missile systems that formed the backbone of our civilian and military space launch vehicle inventory. After solving the problem of controlling launch and re-entry, the military supplied astronauts, docking vehicles, boosters, recovery forces, and engineering talent to the National Aeronautics and

Space Administration (NASA). Since 1958, we have continually pushed technology for weather, navigation, early warning, surveillance, communications, and space defense. Yet, we are accused of not rising to our capacity, of not spearheading Department of Defense space operations. We are said to be divided in our voice and inarticulate in our advocacy. Are we guilty of concentrating on technology or specific missions in space? Is our developer and user community fragmented? Have we developed along technological lines and ignored doctrinal principles in the process?

Similar questions faced strategic airpower before World War II. The concepts were clear to airpower advocates, but were not accepted by the Army. At that critical point, a few professional air officers reflected on the organizational, technological, and operational successes; assessed the failures; and hammered out the doctrinal principles that resulted in the phenomenal advances of airpower during World War II.

We stand today at a similar critical point for military space operations. Many officers know and understand our reliance upon space. Many are committed to protecting our assets while the shuttle and space weapons are opening new technological horizons. But, where are we in the development of military doctrine for space?

Our mandate, as the USAF space leaders of today and tomorrow, is to learn from the past, to decide where we must be by the year 2000, and to articulate the doctrine that will insure a successful and logical progression toward the goal of developing a viable military space force doctrine.

THOMAS J. ELLER, Col, USAF
Professor and Head
Department of Astronautics and
Computer Science
Chairman, Steering Committee
1981 USAFA Military Space Doctrine Symposium

CHARLES D. FRIEDENSTEIN, Maj, USAF
Assistant Professor and Director of
Research
Department of Astronautics and
Computer Science
Director, 1981 USAFA Military
Space Doctrine Symposium

# Major Recommendations

# I. MAJOR RECOMMENDATIONS

During the one and a half days of roundtable discussions, numerous issues were discussed. There was a spectrum of outcome, ranging from unanimous agreement to totally divergent opinion.

In this section, we have attempted to display separately the outcome on only the major issues. The reader is encouraged to refer to Section III, Proceedings, for further detail and a discussion of the remaining issues.

## PANEL 1 - RECAPITULATION

The discussions of this roundtable on space operations doctrine were very exciting. The frankness with which both the panel members and the roundtable participants expressed their ideas and positions was indicative of everyone's real concern for the future of military space operations.

### MAJOR ITEMS OF CONSENSUS

1. The threat or perception of a threat to national security has been and will continue to be a key impetus for the development of military space systems and associated missions.

2. In periods of response to threats (Sputnik), the lack of monetary constraints played a key role in the advocacy and timely development of military space systems.

3. Present space systems have been developed primarily to support terrestrial forces, but future systems will have this role as well as the role of controlling space.

4. The lack of a strong advocate for space has inhibited (especially in the fight for funding) the development of space systems. A strong advocate is crucial to future space systems development.

5. The survivability of military space systems must be increased significantly to provide assured support to the users. Spacecraft autonomy and the use of higher orbits will be key innovations in increasing survivability.

6. Present space missions and associated systems have developed in an inductive, incremental manner. In the future, development should follow a deductive approach consistent with national objectives, strategies, and force employment doctrine.

7. No common, accepted definition of doctrine resulted from the roundtable discussions. Before future discussions of space operations doctrine can be

fruitful, a better understanding of doctrine and its applications must be developed.

8. A lack of education about space and its potential has hindered the development of military space systems.

9. AF Systems Command became the space system's operator primarily because it had the technical people required to operate the complex military space systems.

10. Expendable launch vehicle systems are definitely needed as a shuttle backup for the launch of military space systems key to our national security.

11. Sometime in the future, a combat role will develop in space.

12. In the future, a military requirement will exist in space to protect not only military assets, but also civilian, commercial assets.

13. The military should participate in the exploration of space.

14. The role of man in space will continue to expand. Man will be required to retrieve and repair spacecraft, construct large structures in space, and above all, use his unique judgment and decision-making abilities to enhance military space missions.

15. A large, permanent, manned space station and a manned aerospace plane should be developed in the future.

OTHER MAJOR ITEMS OF DISCUSSION (NO CONSENSUS)

1. "Technology push" was/was not a key factor in the initial development of military space systems.

2. Analogies between the development of airpower and spacepower are/are not appropriate.

3. The Air Force and its leaders have/have never pushed for the Air Force to be involved in space.

4. Operational users of space systems have/have not participated enough in the development of space systems.

5. Intelligence and technology people have/have not been the primary drivers in the development of space systems.

6. Present military space systems are/are not getting the job done.

7. Security classification and compartmentalization have/have not inhibited user involvement in space operations.

8. The Air Force has/has not accepted space as one of its missions.

9. Through the early 1990's, the space shuttle will be able to do more/less than present expendable launch vehicles.

10. In the near term, the military must/need not attain the capability to operate the space shuttle independently of NASA.

11. Basic doctrine for space does/does not exist in Presidential Directive (PD)-37 and AFM 1-1 and operational doctrine does/does not exist in the form of draft AFM 1-6.

12. Air power doctrine exists today, but it is/is not really used.

13. What are the proper relations between national policy, basic doctrine and operational doctrine in the space arena?

14. The Air Force should/should not take the lead in getting the strategy and doctrine for space properly coordinated with the Joint Chiefs of Staff.

15. The Air Force should/need not seek a clear mandate as executive agent for space combat operations.

16. The United States must/must not develop hardware to accomplish both offensive and defensive space combat operations.

17. Treaty obligations should/should not impede the development of systems for offensive or defensive space operations.

18. The Air Force must/need not accept the role of advocate for both offensive and defensive missions in space.

19. Since any discussion of offensive weapons in space seems to raise too many flags, is it better to talk about strategic space weapons rather than offensive or defensive space weapons?

20. Response by Air Force organizations to draft space doctrine (AFM 1-6 for instance) has/has not been lacking.

21. Present Air Force and DoD organizations are/are not responsible for the development of space doctrine.

22. The Air Force should/need not take the lead in developing space doctrine.

23. A new organization (Space Command?) should/should not be established within the Air Force to develop and carry out space doctrine.

24. A new organization (U.S. Space Force?) should/should not be established within DoD to develop and carry out space doctrine.

25. A Space Operations School along the lines of the old Air Corps Tactical School should/should not be established to develop space doctrine.

26. A separate budget authority (TOA) for space is/is not needed to enhance the development of future military space systems.

## PANEL 2 - RECAPITULATION

The elaboration of an optimum organizational structure for the U.S. military space program must follow the dictates inherent in a U.S. space doctrine, which in turn depends on a clear conception of space itself (medium or mission?), neither of which emerged at this panel.

### MAJOR ITEMS OF CONSENSUS

1. The epoch of airpower development vividly illustrates the trauma that results from introducing a new military dimension into an existing force structure.
2. The major legal and policy frameworks for space are adequate.
3. Appointment of the Air Force as executive (but not exclusive) agent for space has sufficient merit to warrant careful consideration.
4. Strong advocacy is crucial to space development.
5. School(s) of thought as crucibles of doctrine are needed.
6. Over the long-run, a dedicated space organization structure is inevitable.

### OTHER MAJOR ITEMS OF DISCUSSION (NO CONSENSUS)

1. Whether or not current AFSC activities (launch and test range operations and on-orbit control) would be better handled by an operationally oriented organization.
2. How effective advocacy should be marshalled--utilization of existing operational commands as spokesmen or centralization of advocacy with a space command structure.
3. Where schools of space thought should be, established anew or incorporated into present institutions, centralized or dispersed.
4. Whether or not a major Air Force command for space operations should be created immediately.

## PANEL 3 - RECAPITULATION

The activities of the Third Panel roundtables focused on the Soviet Union and its use of space. The major theme of the discussions was the need for the American military and American decision makers to have a clearer perception of the international environment and especially of the Soviet Union.

The Soviet space program was described as having been a well organized, well supported program from its beginning to the present. The primary aim of the program was (and remains) the enhancement of Soviet national power. This power relates to all aspects of international competition from military to economic and political. In support of this goal, the space program receives its guidance from the highest levels of the Soviet leadership.

Soviet space activities are dominated by the military. In addition to the specific guidance received from the national leadership, military space efforts are shaped by an extensive and pervasive military doctrine. This doctrine applies to the entire Soviet military machine. This ensures that space is included in overall military planning and force development. The military role in space is expected to expand in the future as the Soviets appear to have recognized the value of space as the next critical combat arena.

The extensive military programs are complemented by wide ranging civil programs that either directly or indirectly contribute to the growth of Soviet national power. The Russian and Soviet tradition of scientific research also seems to complement the power motivation in many programs. The prestige associated with many space activities is often used to enhance the Soviet position and, at the same time, to degrade that of the U.S. within the world's community of nations.

Manned operations are expected to be important to both military and civilian programs. The flexibility of man appears to be a key to this decision. These activities will continue to emphasize long duration flights. Additionally, large space structures will probably be constructed to support the manned programs. The Soviets may also attempt a manned Mars mission by the turn of the century.

Soviet competition with the U.S. also carries over into the legal arena. Participants in this roundtable raised concern over the need for active U.S. military involvement in negotiations to avoid potential problems. The value of space will also cause other countries to become involved in that environment. This will create legal conflicts over such areas as distribution of frequencies and geosynchronous orbit positions.

The activities of lesser powers are expected to focus initially on commercial uses of space. This will include communications, earth resources, and energy. These systems will, in many cases, transfer directly to military use. Additionally, it was felt that as a country becomes more involved in space, the likelihood of direct military involvement increases.

All of the factors described above are considered important to American planning. An awareness of the international environment, and especially of Soviet perceptions is crucial to the decision making process. The roundtable discussions emphasized the requirement of using this knowledge to develop an American doctrine that will provide clear guidance for the most efficient use of existing resources. This will require the full integration of intelligence, operations, and research and development activities.

MAJOR ITEMS OF CONSENSUS

1. Americans must gain a better understanding of the world environment.
   a. The military must realize the importance of political and economic factors as well as the military ones.
   b. The Soviet world view, doctrine, and motivations must be recognized and considered in U.S. planning and doctrinal development.
   c. Care must be taken neither to underestimate nor overestimate Soviet capabilities.
2. American military planning requires a greater integration of the intelligence, operations, and R&D communities.
3. American military personnel must ensure that they maintain a key advisory role in the formation of national policy and in international negotiations that may relate to the military.

# Speech Texts

## II SPEECHES

Major addresses were presented by Dr. Hans Mark, General Bernard Schriever, LtGen Richard C. Henry, Dr. I.B. Holley, and Dr. Charles W. Cook to stimulate thought, initiate discussions and challenge participants. Dr. Cook's luncheon speech is covered in his paper, "Organization for the Space Force of the Future," printed in Vol II (p 467) of The Great Frontier: Military Space Doctrine: A Book of Readings for the USAFA Military Space Doctrine Symposium. Dr. Mark's address was informal in nature and is therefore not being reproduced.

THURSDAY'S KEYNOTE SPEECH

GENERAL BERNARD A. SCHRIEVER, USAF (RET)

FOR PRESENTATION AT THE

MILITARY SPACE DOCTRINE SYMPOSIUM

UNITED STATES AIR FORCE ACADEMY

2 APRIL 1981

Last night, I took a nostalgic trip in the past. Today, I would like to talk a little bit more about some of the policy matters I discussed last night. Then I would like to consider the potential of space in terms of national security during the short term, the next ten to fifteen years. Last of all, let's take a ride out into the future about 50 years.

I think space has tremendous implications on national security policy, on strategy, on force structure, and perhaps even the survivability of the free world. Perhaps I might be accused of overemphasizing what I consider to be policy implications on national security matters and specifically on space. But I contend that during the past twenty years, the progress we have made from the military standpoint, has been more limited by our national policy than it has been by availability of technology, or our ability to manage. I think the policy has been very inhibiting not only in space, but has also created what I consider to be today's strategic imbalance between the U.S. and the Soviet Union. Just look back 20 years. At that time, we had unquestioned superiority. We were respected by both enemies and friends. We certainly were the leaders of the free world. I ask you to compare our position today with what it was in 1961.

The reason I want to emphasize policy this morning is that I think we are leaving the shadows of our old policy and moving into a new one, a policy which really recognizes the world as it is and recognizes the Soviets for what they are. That gives us a new window to move forward and strengthen our national security by allowing space to play a very important role.

Now let me digress for just a moment. I also think that this meeting here is

extremely appropriate. And I know that Dr. Hans Mark had a lot to do with energizing it. He and I have had frequent discussions about space over the past several years. And I guess as he said this morning over breakfast, no one really listens to us because we are considered as space nuts. But maybe we can get the word to enough people and maybe they will listen to some of you.

Now let me get back to this matter of policy. I want to go back to the "space for peaceful purposes" again. Sputnik came along in 1957 which created a real crisis with respect to technology in this country. President Eisenhower asked Dr. Killian from MIT to be his first Science Advisor who was succeeded by Dr. Kistakowski. Now, these people were all friends of mine, but I don't happen to agree with them with respect to national security. They were very much involved in creating the structure that followed Sputnik, which in my opinion downgraded military space as an important element. Out of the old NACA, they established NASA and gave NASA a major space role. I want to make it clear that I have nothing against NASA. As a matter of fact, I would have done the same thing, but the way in which it was structured and the words that were said at that time, diverted a lot of attention away from the need for military space. And, of course, "space for peaceful purposes" was a phrase that just haunted us. It haunted us constantly. ARPA was established and I have nothing against ARPA, but again it was a dilution of the military getting on with what we needed to do in space. The Air Force, in fact, had all the resources that existed in the nation to go into space. These were the west coast ICBM program and that which was at Huntsville under Dr. Von Braun. So, these resources really were the ones that were brought to bear in creating the space capabilities that exist today. But, the way in which it was structured weakened the Air Force's ability to pursue

a vigorous approach to maximizing and exploiting space for national security purposes.

Now, there was one other arrangement made at that time which also had a bearing on the Air Force. That was a division of the military space program. This really kept away from the operational commanders a great deal of information on what was going on in space. I'm happy to say that steps have already been taken over the past several years to bring about a change in that arrangement.

Military space came out of the Sputnik era, through all of the hearings and all the organizational and structural meetings, in pretty good shape. When Kennedy was elected, he brought into Washington what I called a Cambridge Mafia. It really wasn't all from Cambridge. It was from the universities along the eastern seaboard--consisting of the intellectuals who became the masters of the policy that emanated from the Kennedy administration. It was a policy of accommodation: let the Soviets get even with us and then we can live happily ever after. Let's not have any nuclear weapons in Europe that have the range to hit strategic targets in the Soviet Union. That policy was never debated during that period. It was one of my great frustrations because I saw what it was doing, and couldn't do anything about it. And here are some of the things that happened during that period. In 1961, we cancelled the Skybolt program. The reason given was that it wasn't technically feasible, but as a matter of fact, on the day it was cancelled, we fired one from Eglin Air Force Base from a B-52 and it was 100% successful. Cancellation brought about the fall of the MacMillan Government

in England. deGaulle decided "I've had enough of the United States, I'll have my own nuclear capabilities." So the French Nuclear capability came into being. Now that wasn't the only program cancelled. We had the MMRBM going well. It was a program designed to provide mobile ballistic missiles in NATO with ranges up to 1500 miles. It was cancelled. We had a mobile Minuteman program going. It was cancelled. We had Thors and Jupiters in Italy, England and Turkey. They were withdrawn. The worst thing of all was that there was a stifling of innovation. Let's not have too much technology because it might force us to go into new systems programs. I called it paralysis by analysis. And management from the Pentagon became more micro in nature as the months passed on.

I could go on and on and on and I could get very emotional about this, but I think what I've said should make the point I've been trying to make. We were stifled and inhibited by policy, not technology and know-how. Last night I gave a laundry list of programs that started and stopped during the 60's, but there were many of you that were not there last night, so I'll repeat very briefly. We were very cognizant of the necessity for having an anti-satellite capability. We started the Saint, an ASAT, and it was stopped. The Midas program, for early warning, which I think all of us in the Air Force considered essential, was cancelled by the Secretary of Defense, Mr. McNamara. He said we didn't need it because we could take the first strike and still have enough left to damage the Soviet Union so badly that it would deter their first attack. The Advent, our first communications program, didn't start for about 3 or 4 years after it was obvious that we could have communications satellites. The Dinosaur Program was cancelled. Later the MOL was cancelled. So we had a hectic and frustrating time in trying to get on with the space business. The

only area that got support was strategic intelligence.

The 1970's were slightly more productive. The operational Air Force really did not get the kind of information that it should have gotten. Nevertheless, we do have significant space capability in being. We have strategic intelligence. We do have a warning system that is reasonably good. We have communications. We are well on the way to getting a navigational system, the Global Positioning System. We have weather satellite capability. But, they are highly vulnerable. And we in the Air Force lack a military space doctrine. We are far behind in manned space capability. We lack ocean surveillance, although we know that we can do this with radar.

So, as we move into the 80's, we do have technical capabilities. We have organizations that can get on with the job. And fortunately, as I have already said, we have a new, realistic national policy. This is evident from statements by the President and the Secretary of State, and the already planned defense build-up. In short, there is realism toward the Soviet threat. It seems to be a very propitious time to get going in space. I think this is absolutely essential. There is no guarantee, of course, that we will get the programs that we need, but we at least have a fighting chance because I don't think policy will stand in our way.

Let's look now at the next ten or fifteen years in space and how it can impact policy, strategy and possibly force structure. I sincerely believe that space,

from a military standpoint, is the new high ground. It hasn't arrived, but it will evolve into the new high ground. We've had predominance on land, on the sea, in the air, and now space is next in line. Land was predominant until a few centuries ago. Go back to Alexander the Great and Gangis Kahn: it was land capability. The British took maximum advantage of seapower and were predominant for several centuries. I think World War I was an even split between land and sea. In my opinion, World War II could not have been won without air superiority. So airpower today, is the predominant means of applying military force. This was true even in Korea and Vietnam. We all know that from a military standpoint, they were not declared wars. They were a no win situation. They both could have been won with relative ease if we had applied the forces that were available--without need for nuclear weapons.

So now where does space take us, now that we have had about a quarter of a century of experience? I would like to take a look at where we will be going in terms of general policy considerations, and also with respect to certain programs that I believe to be essential. We've had several studies in the last six to eight months made by the SAB, by the Defense Science Board, and by a transition group which I chaired. Our findings were that we have established a platform from which to launch a new era of $C^3I$, one of essentially real time control of military forces. And this is one area where the U.S. is definitely superior in technology to the Soviet Union and it's an area that we should take maximum advantage of. Concerning national security, I would like to refer to our report which was issued in January of this year and was made available to the new administration. I might say that to date no action has been taken,

but as all of you know when a new administration comes in, it takes a few months to shake down. I know they are thinking right, although they haven't gotten around to detailed implementation. I was talking to Dr. Mark this morning and we have some plans to follow up on these excellent studies that have been made during the past several months. Now, I'd like to refer directly to the study's recommendations concerning national security. Space programs are vital elements of our national defense posture. They enhance our ability to deter war. Space capabilities provide reconnaissance, surveillance, communications, weather and navigation. They greatly augment our warning and intelligence capabilities. If we fail to deter war, space systems will improve our ability to deliver weapons, and to assess damage. To manage military operations, we must be capable of conducting effective space operations during all conditions of conflict. The use of space systems for vital military operations imposes new requirements for their survivability, including satellites, ground stations, data links and control centers. Such endurance can be achieved by either surviving attacks or by replacing space systems during conflict. I might say this is a change in policy for space. A war that will be protracted even in the nuclear environment imposes great new requirements on our space assets. We can no longer acquire space systems designed solely to operate in a benign, peacetime environment. In the future, we must develop systems which can operate effectively during active combat operations. Data from reconnaissance, surveillance and weather satellites must be available to military commanders for successful operations. This takes architecture and integration of the systems so that they will be effective. Survivability of the total systems must be

balanced. For example, while spaceborn elements may be the most physically survivable, jamming of data should be minimized by providing electronic protection against dedicated jammers. Intersatellite links may be required. Launch system facilities and ground terminals must be made more survivable by hardening, proliferation, mobility, and redundancy. The program should capitalize on U.S. technology advantage. For example, producing and proliferating satellites may be essential. They should be designed so that they function in wartime. Additionally, a production and deployment base for satellite replenishment should be established. An architecture for survivability of the total system is needed. A deployed infra-structure for force readiness in space should be our objective. An increased emphasis on space systems is a vital element of our deterrent. Needed improvements in command, control, communications and intelligence are at hand. We should capitalize on the unique capability of high technology space vehicles for strategic reconnaissance and early warning. We must increase exploitation of new space vehicles designed to be used for both peacetime purposes and for direct support of tactical military operations. I might say some steps have been taken to provide the operational commanders with the information and data that is available from space assets, but this has to be accelerated and a much greater effort is required. Space is having a far reaching influence on military operations and it can have a profound influence on warfare. All functional and supporting areas of strategic and tactical warfare can be significantly affected by application of space based systems. In some areas, radical alteration of strategy and tactics is likely.

In light of some impending changes, military space policy and doctrine must be updated. Perhaps we should say it must be created. Our present space

effort is fragile because of a minimum support base for launch and logistics and because of constrained on-orbit capability. Disruption of operations is possible due to a launch failure, on orbit problems, or enemy action. A reaction capability should be provided by on-orbit proliferation and by having a quick reaction back-up launch. More spacecraft should be on the shelf and the logistics and facilities for launch should be improved. The MX provides a potential space launch system for the kinds of things that I'm talking about.

We always talk about technology and what the capabilities are, but very seldom do we talk about the management that is necessary to do the job. Here again, a very special type of management was established in 1962 to fund and execute our reconnaissance activities. It was a streamlined activity in every way and worked very well. It is important to reexamine the existing management for the entire space program and reacquire the ability to complete programs rapidly.

Serious consideration should be given to employing the management arrangements which in the past have been responsive to urgent needs, which provided effective and rapid action, and did so at lower costs because we got the systems quicker. We have that experience, and we need to reinstitute some of those management policies and procedures.

Let me say just a few words on a couple specific programs. I would like to refer first to the Global Positioning Satellite System. The Global Positioning Satellite System I think has one of the greatest capabilities for our tactical operations. The high accuracy and global availability of the GPS system will provide a significant force multiplier when dedicating critical weapons to

destroy strategic and tactical targets. Precise navigational capability will benefit the rapid deployment forces in transporting men and materiel to isolated areas, coordinating rescue operations and a variety of critical missions. GPS position and velocity information can improve the accuracy of ICBM and SLBM missiles when used in conjunction with self-contained inertial navigation systems. In conventional warfare, common grid operation will improve target location and destruction during reconnaissance, interdiction, and stand-off weapons missions. Back in the old forecast days, I had Gordon Saville who headed the tactical panel. Gordon invented the name "hittle" to substitute for missile. I think we are reaching the age where we can hit instead of miss. Instead of talking about CEP's, we ought to talk about hitting targets. Our space assets can provide a tremendous improvement in accomplishing this.

Now let me talk about space warfare because here again we have been inhibited by the UN resolution which in essence bans weapons in space, but does not ban the development of weapons for space. I think it is an unrealistic policy because of what is happening in space today. At the present, both the U.S. and USSR depend on satellite systems for operating their military forces. In the coming years, other countries will also do this. It follows that space systems will become targets in wartime and that anti-satellite systems will become part of the war fighting capabilities of major powers. We must not continue to run behind the Soviets in space warfare capabilities. Our current program should be properly supported and accelerated.

I think this is a quick highlight of the kinds of things we need to do during the 80's to achieve what I consider to be a superior $C^3I$ capability. I think

it will provide us with a positive asymmetry in the application of military forces because I honestly believe we have a substantial advantage in technology for providing this kind of capability. Strategically, I think it would add to our deterrence. I think it would give greater credibility to launch on warning. Launch on warning may well become a necessary part of our strategy, not the whole strategy, but a part of our strategy for deterring the Soviet Union. It certainly will permit us to more effectively carry out our present objective of controlled flexible response. It will reduce the probability of an automatic need for complete nuclear exchange. In a tactical sense, it certainly will provide us with the ability to deliver our weapons when and where with a greater accuracy than we have had in the past. Without survivable $C^3I$, we simply will not have the ability to endure in any kind of a war, particularly if it becomes nuclear. So I can only conclude that the role of space in providing a survivable $C^3I$ must be an urgent and high priority effort for the 1980's.

Now let me project and speculate a little bit into the more distant future, the next 50 years. Now only a fool would talk about the next 50 years because it is just impossible to predict what will happen. I think that when you talk about periods of over 20 years, you always undershoot and underestimate what can be done. We did that in the field of aviation. We have done it in almost every new area because people resist change and the bureaucracy likes the status quo. But, I sincerely believe the next 50 years will see the evolution of space as a new military high ground which will become the decisive arena in military conflict. I think some of the key elements will be manned. We can't perceive today just exactly what role man will play. But man really has the ultimate flexibility in any system and there is no doubt in my mind that man will play an increasingly

important role in space.

There has been a lot of talk about weapons in space. There has been a lot of talk about high energy lasers and particle beam weapons. If we are able to perfect these weapons as offensive or defensive weapons in space, they would also have the capability of defending themselves. If you tie that in with the rapid advances in sensors and the ability to point and track, I can visualize that eventually you can hold land, sea and air systems hostage. So we will have to start thinking about completely new weapons systems, a new structure of military forces. We have to start thinking about countersystems. In the military, we always develop an offensive capability, and not too long afterward, there is a counter system. I don't think we have even started thinking about counter systems to directed beam, high energy systems. We have to start thinking about these things. I don't rule out a military lunar base in the next 50 years. I'm sure everybody has their own ideas as to what might happen, but I do feel that there is sufficient evidence that space will play an increasingly important role with respect to our national security and our military capabilities. The question is: what are we doing about it?

Last night I quoted General Hap Arnold. General Arnold stands out a little more equal among a few great captains. I happen to think that he was one of the most visionary men that we ever had in the Air Force. He said in 1945 that "national safety would be in danger by an Air Force whose doctrines and techniques are tied solely to the equipment and process of the moment. Present equipment is but a step in progress, and any Air Force which does not keep its doctrines ahead of its equipment, and its visions far into the future can only delude the nation into a false sense of security." I believe what he said is

more true and more vital to the future of our country today than it was back in 1945.

We now have a favorable window, as I said when I started, and we have to make the most of it. I think we have to proceed again with a strategy for technology which leads us to take the high risk which can yield correspondingly high military pay-offs. We have to make investments in technologies that provide a positive asymmetry. And only the military, only the national security, warrants the expenditure of huge funds that have pay-offs in the far distant future. We have become too short-sighted in the past years. We have been polishing too many doorknobs. Let's take advantage of the window we have and let's pursue space vigorously because to me in the foreseeable future, it is the last frontier. Thank you.

# Horses, Airplanes, and Spacecraft:
# The Search for Doctrine

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## Horses, Airplanes, and Spacecraft:
## The Search for Doctrine

"Good fortune," said Frederick the Great, "is often more fatal than adversity." Those eight words offer a lesson for all of us to ponder. The teachings of failure, which subvert old ideas and established facts, better serve the military institutions of the future than do successes. Failures teach humility and are the nurse of progress. Successes stimulate blind pride and complacent self-confidence which invite failure in future battles. So let us look to some historical failures and learn from them.[1]

To begin, let's look to our horses. By the end of the Napoleonic era there were four rather clearly defined functions of cavalry: first, the charge, galloping knee to knee, boot to boot, with lance or sabre in shock actions akin to modern armor; second, reconnaissance, where horsemen served as the eyes of the army, probing out ahead of the main force to locate the enemy; third, screening, where small elements of rapidly moving horsemen could cover exposed flanks and serve as a trip-wire against surprise moves by the enemy; and finally strategic cavalry where large forces of horsemen deliberately avoided the enemy's main forces and penetrated deeply into his rear areas to disrupt his communications, burn his bridges, destroy his supply dumps and production centers, all the while dislocating enemy plans and calculations.

All of these cavalry missions depended upon two critical factors. First, the relative speed differential between a mounted horseman and the footsoldier, roughly 3 to 1. Second, the success of cavalry was

in varying degrees dependent upon the inferior qualities of the muzzle-loading musket with its slow fire and short range. Unfortunately for the horsemen, scarcely a decade after Waterloo the development of the conoidal bullet, best known to us as the Minié ball, drastically altered the military equation.[2] Rifled weapons with ranges up to a thousand yards strongly suggested, at least to the observant, that the day of the cavalry charge was over. Even before the Civil War in the United States some regular cavalrymen were urging the elimination of the sabre: Sabres, one wrote, are "simply a nuisance; they jingle abominably, and are of no earthly use." The Surgeon General's Civil War wound statistics certainly confirmed this view. After months of operations where the Union forces suffered tens of thousands of bullet wounds, only 18 authenticated cases of sword injuries could be identified.[3]

Probably the most successful cavalry action of the Civil War was a strategic raid by General James Wilson, who, incidentally, became a major general at age 27. Leading a force of 14,000 cavalrymen armed with Spencer repeating rifles, Wilson set out from Tennessee. He cut a swath clear through Alabama, destroying arsenals, foundries, and supply dumps and tearing up rail lines. On the few occasions when this fast moving force was unable to evade Confederate concentrations, it fought dismounted.[4]

One would think that the experience of the Civil War in the United States would have drastically altered the conception of cavalry throughout the Western world. But the social prestige of crack cavalry regiments and their brave showing on parade made it difficult to read the historical record realistically. European military writers, (one

cannot say military thinkers) were inclined to blame poor leadership rather than faulty doctrine for the failures of cavalry in the face of rapid-fire infantry weapons.[5]

In Britain, Lord Roberts, the beloved Commander in Chief who was popularly known as "Sir Bobs," saw the facts with a clear eye and directed the Cavalry to abolish the lance and be prepared generally to act dismounted. But the horsemen were not so easily dislodged in a foxhunting country.[6] The Cavalry Journal had been founded in 1904 in Britain for the express purpose of defending the notion that even under modern conditions with rapid-fire weapons, cavalry was still extremely important in war. One observer, reviewing the first issue of the Cavalry Journal, summed up the whole tone and temper of the enterprise succinctly:[7]

> It is evident from the number of articles devoted ... to the subject that the editors have deliberately elected to commence with an exposure of the ridiculous contention of the mistaken school of thought by whom it is fatuously asserted that the days of the Cavalry ... are over; and at the same time to illuminate, if possible, the dense intellects of others who have merely failed to comprehend the true functions of cavalry in modern war.

The strength of the cavalry lobby in Britain is evident when one notes that despite the Commander in Chief's directive, the 1907 Cavalry Manual continued to espouse the traditional doctrine:[8]

> The essence of the cavalry spirit lies in holding the balance correctly between firepower and shock action. It must be accepted in principle that the rifle, effective as it is, cannot replace the effect produced by the speed of the horse, the magnetism of the charge, and the terror of cold steel.

This romantic eyewash, mind you, appeared in the official British Army

cavalry doctrinal manual. Instead of providing a whetstone for contradictory opinion, the Cavalry Journal only reinforced the romanticism, asserting grandiloquently, in 1909, "The charge will always remain... it will be the cavalryman's pride to die sword in hand."[9]

Again, one would think that the experience of World War I would have spelled the virtual demise of cavalry. To be sure horsemen did prove useful in certain peripheral theaters: Allenby in Palestine and the Czarists in those vast areas of Russia where the nature of the terrain precluded vehicular traffic. But in the main theater on the Western Front British Cavalry divisions ate tons of costly fodder waiting for the day which never came when they hoped to exploit a breakthrough; 10,000 horses consume as much weight in fodder as the food for 60,000 infantrymen, so the logistical cost was high. None of this experience seems to have made much impression.

The Superior Board of GHQ, AEF, assembled after the Armistice to cull out the important doctrinal lessons of the war, concluded that there were few reasons to change the prevailing doctrine.[10] True, some advances had been made. U.S. Army cavalrymen had substituted the Colt .45 for the sabre. As one wag somewhat sardonically commented, this was a case of mounting "the inaccurate on the unstable."[11] In Britain the same spirit prevailed. What, fumed one irate cavalry officer, "replace the horse with a tank? Why you might as well attempt to replace our railway system by lines of airships"![12]

But J.F.C. Fuller, the military historian and close student of doctrine, was more perceptive. The cavalry is doomed, he said, and must give way to the tank. With his broad knowledge of history, however, he foresaw difficulties in replacing the horse with armored forces. "To establish a new invention," he cautioned, is like establishing a new

religion--it usually demands the conversion or destruction of an entire priesthood."[13]

In the United States the cavalry priesthood proved remarkably persistent. As late as 1938 General Walter Krueger, the Chief of the U.S. Army War Plans Division was still opposing the formation of a mechanized cavalry division. The Chief of Cavalry, Maj. Gen. J.K. Herr was more broad minded. He favored the creation of mechanized cavalry provided this were done not by converting existing horse units. It was this kind of thinking which led to the presence of two regular horse cavalry divisions at the Army maneuvers in Louisiana in 1940, long after courageous but futile Polish cavalry lancers had been decimated when charging invading Nazi panzer columns.[14]

What can we learn from this cavalry story? By virtue of hindsight we can perceive many of the horsemen's failures with considerable clarity. Clearly, cavalry doctrine was not kept abreast of technological advance. Armies of the time lacked appropriate organizations and procedures to perfect suitable doctrines. Too often those who thought about the problem at all were swayed by romantic or emotional considerations and failed to assess the problem objectively.

Surely a rational, scientific approach would suggest the desirability, the necessity, of a patient and exhaustive search for data from operational experience, at home and abroad, experience in wartime and in peacetime maneuvers. Logically, this data-gathering should be followed by a careful assessment of the evidence to screen out opinion and insure a high degree of objectivity in the evidence from which one attempts to formulate doctrine.

And what is doctrine? Simply this: doctrine is officially

approved prescriptions on the best way to do a job. Doctrine is, or should be, the product of experience. Doctrine is what experience has shown usually works best.

Doctrine is not the same thing as dogma. Where dogma is frozen, fixed, unchanging, and arbitrary, based on authority, akin to "revealed truth," doctrine is open-ended. Doctrine is subject to continual change as new developments, new experience, technological innovations, and the like, require us to reconsider and impel us toward a revised statement of official doctrine.[15]

In the abstract, it is not very difficult to describe what is needed to decide how best to apply the horse, the airplane, the spacecraft, or any other asset as a military weapon. We simply proceed in a truly scientific spirit in search of objective evidence upon which to build our decisions. Unfortunately, what seems simple and straight forward when described in so many words turns out to be exceedingly difficult in practice.

To begin with, actual battle experience is elusive; oftentimes it turns out that even the participants aren't sure what happened. It is difficult to be objective, to rise above the din, to attain true perspective. Further, by no means all who participate record their experiences. Even those who do, record them incompletely or inaccurately. As a consequence, the so-called evidence that becomes available for analysis is, all too often, partial, fragmentary, and not infrequently a vital portion of evidence is missing. It is one of the drawbacks of history that we cannot re-run the episode or the battle in the same way we can rerun a scientific experiment in the laboratory to pick up the observation we missed the first time around. Further, in the long intervals between

wars, we must rely on tests, exercizes, simulations, and maneuvers, bloodless battles, which only imperfectly provide us with the kind of evidence we need. As if these inherent drawbacks weren't enough, there are other obstacles in our path which make our search for objective data difficult and sometimes seemingly impossible.

Military organizations are not ideal instruments for use in the search for truth. Military organizations are hierarchical: two stars outrank two bars. But what does this really mean? Where matters of opinion are concerned, rank certainly has its privileges. Greater rank presumes greater experience and therefore greater respect for its opinions. Let's never forget, however, that this applies only to opinion. As Secretary Schlesinger used to say you're entitled to your opinion but not to your own exclusive set of facts. Where we are dealing with questions of fact, two stars do not outrank two bars. Sometimes stars forget that bit of truth. One is reminded of that perceptive 19th Century soldier, General Sir Edward Hamley, who cynically defined tactics as "the opinion of the senior officer present."[16]

Caricatured in this fashion, we all instantly recognize the absurdity of all attempts to impose the authority of rank upon what are or should be matters of objective fact. Yet, absurd or not, the record of how technological innovations have been integrated into the armed forces as weapons is strewn with examples of wishful thinking and failures to distinguish fact from opinion. Our past is littered with examples of failures in mustering objective evidence for orderly, systematic, and dispassionate evaluation.

And why has this been so? Largely, it appears, because military men have been slow to devise organizations and procedures explicitly

directed to the perfection of doctrine. Traditionally, armed forces have attracted activists, men generally better at "doing" than "reflecting." This is understandable; philosophers don't make good shock troops. What is more, philosophers and military intellectuals tend to give Delphic responses. They tend to speak ambiguously. They don't give clear-cut answers or easy-to-follow lessons learned; they speak only of insights. Military historians are exasperating fellows; they profess to help the decision-maker, the activist military commander, to see more deeply into his problem. They are exasperating because instead of simplifying the commander's problem they only show him how much more difficult it is than appeared at first blush.

To illustrate the trouble commanders have with intellectuals let me digress a moment to recall Napoleon's dilemma in Russia. He had led the Grand Army deep into the enemy country and occupied Moscow, the *symbolic heart of the nation.* Winter was threatening but the emperor wanted to remain in Moscow as long as he could for the advantage it gave him when negotiating the peace proposals he hoped the Russians would offer him. On the other hand he knew he must extricate his army from its dangerously extended position before the Russian winter closed in. So he turned to his chief scientist, Pierre Simon Laplace, and asked him to determine how long the French troops might safely linger in Moscow. On the available meteorological data from past seasons, Laplace calculated that there was a 100 to 1 probability that extreme cold would not set in before 25 November. Napoleon acted on this advice and stayed. On the sixth of November the thermometer dropped precipitately, winter swept in with more than usual severity, and the French army was virtually destroyed.[17]

Clearly Napoleon was on the right track when he employed a leading scientist on his staff. But in this pioneering effort at operational research he learned the hard way that even when one tries to be objective in looking for evidence from past experience, the process is frought with difficulties.

Now then, where are we? Why is this exasperating historian mucking around with horses when this is supposed to be a space symposium? I hope my message is lucidly clear: the main outlines of what is needed to develop sound doctrine could have been discerned from a close study of the cavalry experience during the hundred years or more following the defeat of Napoleon. Regretably, such a study was not made and we blundered ahead with another innovation, the airplane.

The airplane which the Wright Brothers brought to the Army in 1903 was a rather flimsy contraption. After looking it over, General Foch, who later would become the Supreme Commander of the Allied Forces in France, dismissed it out of hand. "That's good sport" he said, "but for the Army is of no value."[18] Foch was no bonehead; he was a thoughtful student of warfare whose volume of Principles was widely used in war colleges. His spurning of the airplane was, however, a classic example of throwing out the baby with the bathwater. To be sure, the Wright Brothers' aircraft was indeed a flimsy contraption with only the slenderest margin of weight-lifting capacity. If military intellectuals such as Foch failed to perceive the latent powers of the airplane, it is easy to see why officials in the United States had some difficulty in soundly conceptualizing the potential of this innovation at a time when the Army was still a horse-drawn institution.

How should the airplane be exploited? A good case could be made

for visualizing aircraft as the logical successor of the horse. The speed differential it enjoyed over infantrymen would permit it to perform many traditional cavalry missions to great advantage. Certainly its ability to fly over obstacles and avoid enemy blocking forces on the ground held high promise of performing the deep penetration, independent strategic mission into the enemy's heartland, a mission already well defined doctrinally by the cavalry. But the horsemen would have none of it. Already threatened by the appearance of the gasoline-powered truck and the scout car, the cavalrymen saw the airplane as just another challenge to their traditional perquisites. What is more, the noise and smell of internal combustion engines frightened their horses!

So the airplane was adopted by the Signal Corps. There was a good deal of logic in this decision. In 1903 the Signalmen were the most scientifically inclined officers in the Army. Moreover, the decidedly limited lifting capacity of existing aircraft precluded any immediate application of airplanes to strategic missions requiring heavy loads of bombs capable of significant destruction in the enemy's rear areas. It followed naturally, then, that the Signal Corps would develop the airplane to provide yet another tool, along with the telephone and telegraph, in the service of information.

Although it may have seemed logical at the time, the decision to assign the airplane to the Signal Corps was to have profound consequences. The Signal Corps was a service, not a combat arm. Its officers saw themselves as ancillaries, assisting the three combat arms to carry out their tactical missions. In this context it was virtually inevitable that the airplane would be developed as an observation platform. Airplanes

would be employed as the eyes of the army, rather than as offensive weapons geared to a strategic mission in emulation of the strategic role already well defined by traditional cavalry doctrine.

At least in part as a consequence of this accident of organizational or institutional sponsorship, the Army emerged from World War I with a genuine appreciation of the importance of the airplane as a useful adjunct to the ground forces. On the other hand, the case for the airplane as a weapon of strategic potential had not been adequately demonstrated--not, that is, to the satisfaction of those in command.

The story of how a small band of zealots, true believers in strategic air-power, struggled for the next twenty five years or more to implement their ideas is too well known to require repeating here. Billy Mitchell as prophet and idol and his younger disciples--Arnold, Andrews, Spaatz and Eaker, to name but the best known among them, all contributed to the struggle in varying ways. They deserve their place in history. We are not here, however, to celebrate success. May I remind you, we set out to look behind the façade of success to analyze failures. Our sole purpose is to understand better how doctrine may be kept abreast of technological innovation. We have time for no more than one or two glimpses into the tale of how the Air Corps developed doctrine for strategic airpower.

The task of formulating doctrine fell largely to the faculty of the old Air Corps Tactical School. In many respects the problem confronting these men was not unlike the problem confronting those of us who are trying to devise suitable doctrines for space. With no more than an exceedingly slender base of actual combat experience with strategic bombardment in World War I, air arm officers had to extrapolate,

making imaginative projections as to what bomber operations in the future would involve. They were further handicapped by the usual and inevitable peacetime shortage of funds which slowed the development of progressively better hardware.

Adversity, lack of funds, and limited numbers of men and aircraft put a premium on perfecting procedures to insure that every bit of experience was properly squeezed to produce its quota of information for use in concocting doctrine. Sad to relate, Air Corps officers too often seem to have been unaware of, or insensitive to, the need for developing rigorous standards of objectivity when assessing the meager shreds of available evidence. A brief look at a crucial episode at the Tactical School will illustrate my point.

In the early years of the Tactical School when the memory of World War I was still fresh in everyone's memory, the boys in the Bomber Branch displayed considerable realism in their thinking. When they projected long range strategic bombardment missions, they visualized fighter escorts going along to fend off enemy attacks. This view persisted at least down to 1930, but thereafter the picture changed radically. The bomber enthusiasts began to move into positions of power and influence in the Air Corps and secured more funds for the development of significantly superior bombers.

The appearance of the Martin B-10 bomber which could out-fly the older fighters in the Air Corps inventory ushered in a whole new attitude. If the bombers could out-run fighters what could stop them? Fired with a new enthusiasm, some of the bomber boys began to suggest that there was no longer a need to invest funds in other types of aircraft. By 1934 the official Air Corps text on "Air Force" was asserting unequivocally

that the bomber was the principal weapon and its offensive role was the principal mission of the air arm. It went on to assert that all other forms of aircraft could be developed only by diverting funds which could be used to perfect the bomber. Not surprisingly the pace of fighter development lagged.[19]

Gradually it became an article of faith with the enthusiasts that the bomber was invulnerable. "A determined attack, once launched," said a Tactical School instructor, "is most difficult if not impossible to stop." An official umpire after an elaborate air defense exercise at Wright Field flatly declared "it is impossible for fighters to intercept bombers."[20] On the West Coast in 1933 Lt. Col. Hap Arnold decided to put the issue to a test, pitting P-26 pursuits against B-12 bombers, improved versions of the Martin B-10. On the basis of this trial Colonel Arnold concluded that pursuit aircraft would rarely intercept bombers and then only accidentally. He envisioned pursuit aircraft in the future as limited to operations against other pursuit or observation planes. "It is doubtful," he concluded, "whether such operations justify their existence."[21] This virtual dismissal of fighter aircraft, mind you, was the conclusion of the man who would subsequently command the mighty AAF in World War II.

Not everyone was willing to swallow the results of Colonel Arnold's tests so readily. At the Tactical School, the head of the Pursuit Branch was Capt. Claire Chennault. He subjected Arnold's report to a thorough-going, objective analysis. To begin with, he observed that Arnold had stacked the deck, using an obsolescent fighter against the very latest model bomber. "Technical progress," Chennault observed, "within a very short time may make the estimates of time and place

wholly obsolete. The principles involved, however, will remain constant...." Then he proceeded to enumerate the factors which should enter into a determination of the ability of pursuit aircraft to intercept bombers: the type of airplanes on hand, the location of their airfields, the availability of a warning net to give timely information on the location of the attackers, weather conditions, and the relative firepower of the opposing forces.[22]

Chennault concluded, on the strength of his analysis, that what the Air Corps needed was a single-place fighter with substantially extended range. This would facilitate interception of attacking bombers and at the same time would permit fighters to serve as escorts for bombers on long range strategic missions into enemy territory. Subsequent events were to confirm the validity of Chennault's objective analysis. Unfortunately, Col. Oscar Westover, the commander of the GHQ Air Force, the strategic air arm of that day, chose to ignore Capt. Chennault's findings while accepting Colonel Arnold's highly subjective conclusions which rested more on opinion than on fact. Bombers, Westover asserted in his official report, can accomplish their mission "without support."[23]

The failure of those in command in the Air Corps to insist upon the most rigorous analysis of the available evidence when developing bomber doctrine was to have the gravest consequences, as we all know, when World War II broke out. Bomber doctrine, when subjected to the brutal test of actual warfare, was found wanting. The RAF, when attempting daylight bombardment missions beyond the range of fighter escorts suffered prohibitive losses. So appalling were these losses, the British authorities switched their doctrine and limited their deep penetrations

to night raids when interception was infinitely more difficult. The survival rate went up at least temporarily, but there was a sharp decline in ability to find and hit strategically significant targets which went far to nullify the concept of strategic air power.

These facts were known to the Americans well before Pearl Harbor, but the knowledge did not bring about an alteration of the prevailing bomber doctrine. When Gen. Carl Spaatz took the first elements of the 8th Air Force to England in the summer of 1942 he faced a painful dilemma. On the one hand, RAF leaders with combat experience behind them asserted that daylight bombing could not be done without unacceptable loss. On the other hand, Air Force doctrine, as yet untested and resting largely on faith, held that daylight precision bombing would be successful, the bombers would get through to perform their strategic mission without escorting fighters if that mission required penetrations beyond fighter range. Which view was the right one? Only a test would decide.

So the 8th Air Force began its tentative probing of Hitler's Fortress Europa with the limited resources at its disposal. The first few missions were successful. Not until the tenth mission did the bombers suffer a loss. These were shallow penetrations close to the coast and within the range of escorts. In October, 1942, a 38 bomber raid struck German targets in France accompanied by a swarm of 400 escorting fighters. Not surprisingly the raid was a success. But what did such raids prove? Did they warrant the optimistic report sent back to the United States that "day bombers in strong formation can be employed effectively and successfully without fighter escort"?[24]

I repeat, after a mere 14 heavily escorted shallow penetrations, here was the commander of the 8th Air Force making an inferential leap,

reaching the unwarranted conclusion that bombers could successfully perform strategic missions without fighter escorts. Clearly, this was an act of faith not logic. But the dreadful consequences of this faulty inference were to be masked for several months by a number of circumstances. Throughout 1942 and during the early months of 1943, three-quarters of the German fighter force was tied up in Russia or in North Africa. Moreover, diversions of cadres to build up Allied air units in North Africa weakened the 8th Air Force so seriously that it was unable to mount a really large scale assault for many months. As late as February, 1943, an average of only 70 bombers were available for each 8th Air Force attack on the Continent. So a true test of bomber doctrine was deferred.[25]

Meanwhile the Germans were developing some formidable defenses. They improved their radar screen, arranged for a more appropriate positioning of fighter bases, and perfected the lethal tactic of nose attacks on in-coming bombers whose frontal fire power was then deficient. These actions on the part of the Germans began to take their toll.

During the summer of 1943 loss rates for 8th Air Force bombers soared sickeningly. The Schweinfurt raid suffered 28.2% losses with 50% of the survivors requiring extensive reparis which delayed launching further attacks. Statistical studies quickly showed that unescorted raiders suffered losses seven times greater than those undertaken with escorts.[26] That the 8th Air Force continued to press its strategic assault in the face of these devastating losses is a tribute to the courage of the crews if not exactly a monument to the existing system for devising appropriate doctrine.[27]

As we all know, the solution to the escort problem was the drop tank. To consider but one example, the P-47 had an initial range of 175

miles. By expanded internal tankage this was extended to 230 miles. During July, 1943, by adding 75 gallon drop tanks the maximum range was extended to 340 miles. By February, 1944, hanging on two 150 gallon drop tanks gave the P-47 a range of 475 miles. By then the P-51 with drop tanks was going 560 miles--all the way to Berlin.[28]

If the drop tank was such an obvious solution to the problem of providing long range escorts, why did it take so long in coming? Wasn't it obvious at the time? There are two sides to the answer: a technical side and a conceptual side. We haven't time to retrace the whole technical tale here. Suffice it to say there were a lot of problems to solve. Someone had to design sturdy pylons and bracing to prevent buffeting by the tank in flight. Someone had to devise a valve to control the internal static pressure of the tanks. Then there was the problem of installing pumps which proved necessary when extracting fuel above 20,000 feet. One model drop tank involved 159 parts, including its mounts and external plumbing. This required the services of 43 different manufacturing firms. These, of course, were all perfectly normal developmental problems. Given time, each of these difficulties could be surmounted.

More serious, however, was the conceptual failure which lay behind the decision to use drop tanks. Back in February, 1939, when a manufacturer came in with a scheme for developing drop tanks, the Chief of the Air Corps, Hap Arnold, decreed "no tactical airplane will be equipped with droppable auxillary fuel tanks." More curious still is the decision of the Chief of the Plans Division, in the Office, Chief of Air Corps, who in March of 1941 turned down a proposal to add drop tanks to extend the range of fighters. By this date the RAF had already abandoned

daylight bombing in principle, and the challenge to existing Air Corps doctrine was evident.[30]

You may be surprised to learn that the officer who made this fateful decision in 1941 was none other than Carl Spaatz. The document which articulated his disapproval spelled out his reasoning: "It is believed that," he wrote, to permit carrying bombs or drop tanks would make for "unnecessary weight and operational complexities incompatible with the mission of pursuit." The document went on to say that the accretion of "extraneous details" not only would give aircraft designers "confused ideas" regarding the essential requirements for fighter aircraft but also provided opportunities for "improper tactical use" of these airplanes.[31]

Let's take a closer look at this document. Notice that phrase "It is believed that...."; subjective opinion, not a statement of fact supported by evidence or based on official documentation. The cost of loose thinking runs high. Literally hundreds of crewmen lost their lives because escort fighters of suitable range were not ready when needed. Further, the lack of escort fighters jeopardized the whole effort to prove the feasibility of strategic airpower. What an irony that he who was to command the 8th Air Force and suffer the brutal losses incurred in ramming home the Combined Bomber Offensive in 1943 and 1944, had it in his power in 1941 to provide the solution but didn't.

My curiosity now thoroughly aroused, I wondered who actually had done the staff work which lay behind this document signed by Spaatz. The working papers in the archives gave the answer; the initials were there: HSV, Hoyt S. Vandenberg, who would later become the second Chief of Staff of the newly formed postwar Air Force, following on the

heels of General Carl Spaatz. Vandenberg, before coming to the Plans Staff, had been an instructor in the Air Corps Tactical School--in the Pursuit Branch, no less! Manifestly he had not inherited Capt. Chennault's gift for rigorous and objective analysis.

We need carry our narrative no further. Clearly the story of how doctrine was devised for the airplane bears a painfully striking resemblance to the story of how doctrine developed, or was not developed for the horse cavalry. Let me conclude this foray into history, then, by attempting to distil a few useful insights from the record of experience we have been exploring. The past, even a past on horseback, has a message of significance for today.

We are on the verge of a great age in space when it will be of the utmost importance to exploit the spacecraft as a weapon to its fullest potential in our struggle for survival. On the analogy of the horse and the airplane, we must explore the full range of the offensive and defensive capabilities of spacecraft. We must study no less avidly their limitations. Again, on the analogy of the airplane, we must not delay our effort to conceptualize the eventual combatant role of spacecraft even if current treaty obligations defer the actual development of hardware.

If the record of the past tells us anything, it is almost certain that we shall make as many mistakes in formulating space doctrine as we did with cavlary doctrine and airpower doctrine, if we don't first get our house in order. Which is to say, we must first be sure that we have built a truly effective organization for concocting doctrine and have staffed it with the best people we can find.

What is a sound organization? In the final analysis no organization

is better than the procedures devised to make it function.[32] Yet on every hand in the armed forces today we see men in authority assigning missions and appointing leaders to fill boxes on the wiring diagram while seriously scanting the always vital matter of internal procedures? It is the traditional role of command to tell subordinates what to do but not how to do it; nonetheless it is still the obligation of those in authority to insure that the internal procedure devised by their subordinates meet the test of adequacy.

And what do we mean by the best people? We must have officers who habitually and routinely insist upon objectivity in their own thinking and in that of their subordinates. This does not rule out imagination and speculation by any means. But we must have officers who insist upon hard evidence based on experience or experiment in support of every inference they draw and every conclusion they reach. I challenge you to apply this rigorous standard to every paper submitted to this symposium and to every finding we come up with.

We need officers who will go out of their way to seek and to welcome evidence which seems to confuse or contradict the received wisdom or their own most cherished beliefs. In short, we need officers who understand that the brash and barely respectful subordinate who is forever making waves by challenging the prevailing posture just may prove to be the most valuable man in the organization--that is, if he is listened to, and providing his imagination and creativity can be disciplined by the mandate that he present his views dispassionately and objectively.

As wise old General Sir John Burnett-Stuart put it to Liddell Hart shortly after being given command of the British experimental armored force in 1926: "It's no use just handing over to an ordinary Division

commander like myself. You must [assign] ... as many experts and visionaries as you can; it doesn't matter how wild their views are if only they have a touch of the divine fire. I will supply the common sense of advanced middle age."[33]

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## Footnotes

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12. Luvaas, Education...., 355.

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14. Hoffman, 14 and Herr & Wallace 256.

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23. Greer 59, 65. See also Robert F. Futrell, Ideas, Concepts, Doctrine: A History of Basic Thinking in the United States Air Force, 1907-1964, Air University, Maxwell AFB, Alabama, 1971, 1974 edition, p. 35.

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28. Spaatz Report, Part I, Vol. II, 1947, pp. 2-4. Simpson Historical Research Center, Maxwell AFB, Alabama, (SHRC) 106-90. These figures differ in some particulars with those found in Report of Lt. Gen. Ira Eaker, 8th AF, 20 Feb. 1942 to 31 Dec. 1943, p. 6, SHRC 168. 61-3, See also Emerson, "Doctrine and Dogma.... 60.

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32. For an extended discussion of the procedures involved in formulating doctrine, see I.B. Holley, Jr., "The Doctrinal Process," 59 Military Review (April 1979) 2-13.

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# FRIDAY'S KICKOFF SPEECH

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FOR PRESENTATION AT THE
MILITARY SPACE DOCTRINE SYMPOSIUM
UNITED STATES AIR FORCE ACADEMY

3 APRIL 1981

Good morning ladies and gentlemen . . . It is a distinct privilege for me to speak to you today on the subject of military space doctrine. It is especially fitting that we meet at the U.S. Air Force Academy to discuss and examine a body of principles that may well chart the future course of our national military space program - for it is here that young minds are exposed to creative thinking and logic patterns which serve to prepare a cadet for a career in the Air Force. Anticipating change and projecting future requirements surely takes not only creative thinking and a generous amount of logic, but it also demands a comprehensive knowledge of history.

There is an important parallel. To project the needs and requirements of our future military space operations, we too must study our past and from the lessons we've learned extrapolate into the future. I believe that within the military space program today we have reached a point in history where we must closely explore doctrinal alternatives and more carefully define our goals and objectives in terms that will help us maintain international stability during a time many world leaders describe rather succinctly as "The Dangerous Decade".

For example, former CIA director Stansfield Turner calls the 80's more precarious for this country than the 60's and 70's because we are facing for the first time a Soviet leadership that no longer feels militarily inferior to the United States. Now, whether that perception is grounded in fact is incidental. It is, however, a perception which our government, we as American citizens, and our allies around the globe must contend with. It is a new challenge for us and one that is occupying a great deal of our attention.

The challenges we face in our military space program are in a large part related directly to this Soviet perception. Last year, for example, the Soviets launched more than 80 satellites. We launched about a dozen. They launched two manned missions. We launched none. Still, I will argue that our largest technological advantage lies in the sophisticated machinery we put in space. If we can properly exploit that advantage, we may compensate in military efficiency for what we lack in men and materiel. I am convinced that, given the proper direction, our military use of space will, quite properly, significantly assist in deterring war and directly enhance the combat efficiency of our fighting forces. I believe what is needed is a space doctrine that may well light the path that keeps us on a scale of international stability.

Against that background, a short history lesson will help set the stage and show not only the need for doctrine, but the effects if we do not have one.

Development of military capabilities using space is a natural evolution of the development of airpower - the problems we face, however, are in some ways similar to the cultural problems associated with the introduction of aircraft, but those problems loom larger because of the increased complexity of our modern day world. To put it in historical perspective, the Wright Brothers flew their first aircraft in 1903; think how they would feel if they now could observe our sophisticated aircraft such as the F-15, the C-5 or the deluxe airliners. Indeed, the historic first flight at Kitty Hawk was shorter than the wing span of a modern C-5.

We put our first spacecraft in orbit on October 4, 1957 - a mere 23 years ago. Since that time, our operations in space have been mind-boggling - yet, to drive the point home, if we were talking about the

similar period of aviation development, we would still only be in the year 1926. It is becoming more and more apparent that the military use of space has the same potential today to revolutionize military capabilities much in the same way the airplane did during the first half of this twentieth century.

We are already seeing the impact. Since mankind put its first spacecraft in orbit, the world's superpowers - the United States and the Soviet Union - have made considerable strides toward exploiting the use of space for military purposes. Today, more than 40 U.S. spacecraft of DOD origin support military missions around the world through communications, navigation, weather forecasting, surveillance and reconnaissance.

As a result of their proven effectiveness, our national security is becoming increasingly dependent on the reliable operation of these space systems. Every spacecraft we orbit supports more than one service, in some cases DOD agencies and in many cases provides information that transcends service missions and is truly national in character.

Looking in history's lesson book again, we know that the development of an air doctrine was no easy task. Conflicting opinions by well-meaning men made decisions difficult. We are more than aware of the battles waged over the role of airpower; legendary heroes like Billy Mitchell and General Doolittle are but two names of men who were decisive catalysts in the formation of our current air doctrine. Yet, even today, discussion continues on air doctrine - but in a more muted tone.

As for our military use of space, the difficult decisions about national priorities that will affect our nation's future lie in wait today. General Thomas D. White, former Chief of Staff of the Air Force, introduced the term "aerospace" during congressional testimony in the late 1950's - and, by doing so, showed the Air Force's commitment to the development of space

programs. A little more than two decades later, we have arrived at a point where the technological expertise exists to exploit space as a new, viable medium to support ground, naval and air forces. We stand ready to respond to specified plans and strategies based on national commitment, prioritization and funding.

However, it is difficult to have that technological capability recognized when there is no formal road map outlining our national priorities, policies or objectives. Let's examine some reasons why this is so.

Space is a new medium - and, in many ways, much more difficult for the average person to understand than the medium of air was in the early part of the twentieth century. The American public - and even many of our own service members - do not really understand space systems and conceive of space only in terms of astronomy of entertainment-induced "Star Wars" imagery.

At Space Division we deal with reality. We are in business. We have been minding the store for over two decades. To help understand the business, it may be useful to describe what we do in a short summary.

We operate the Eastern Test Range extending from Canaveral down through Ascension; we operate the Western Test Range extending from Vandenberg, up and down the west coast out through Hawaii. We operate launch pads on Canaveral and Vandenberg; we have 13 C-130s, and seven H53s in Hawaii. We operate three ocean going tracking ships, two in the Atlantic and one in the Pacific. We operate tracking stations in New Hampshire, Thule, the United Kingdom, the Seychelles Islands, Guam, Hawaii and Vandenberg. We operate a computer complex and a communications hub and more than half a dozen mission control centers in Sunnyvale. We develop and procure spacecraft. We develop and procure boosters. We integrate the spacecraft

on the boosters and light the fuse and launch them. We position the spacecraft on orbit and provide for their maintenance. We turn the mission payloads over to SAC, the Navy, the DCA and other organizations.

We are 4,000 officers and airmen; we are 3,000 Air Force civilians; we buy 1600 man-years of system engineering support from the Aerospace Corporation and we employ 14,000 service contractors. This year we are spending about 3 billion dollars. We are not perfect but we try very hard to do it right the first time. We stand proud for our successes; we stand not so proud for our failures. And that, ladies and gentlemen, is your Air Force Space Division.

It is true that we are an R&D organization, a part of the Air Force Systems Command, but you can see that we have evolved slowly, but surely, into an activity that encompasses more than the traditional development and acquisition functions.

Much debate within the Air Force centers on the departure from the norm of separation between acquisition and operations. The issue centers on our inability to define the line between acquisition and operations. It is very clear in a mission such as space defense. Yet, it is not so clear in the other mission areas where space systems are primarily in a supporting role to our operating forces: in communications, navigation, meteorology and the like.

This may be due to the technical nature of our spacecraft on orbit or it may be due to the R&D character of our activities. It is true that there is nothing routine about either launching or supporting spacecraft on-orbit and we still need to rely heavily on engineering talent for both functions.

However, time after time, we have examined the military utility of

space and continue to the same conclusion - that its primary purpose is the collection of, and transmission of, military information. This, in itself, is very, very important to our operating forces. The ability to move military information to and between ships, squadrons and battalions can make a significant contribution to combat efficiency. Any student of military history will quickly recognize the tremendous importance of taking advantage of any opportunity to reduce the confusion of battle - and even the misperceptions or misunderstandings that can lead to the onset of war.

Let me describe a few examples of how we are using space today to move military information. You are probably already familiar with most of them.

If a pilot has a jam resistant receiver, for example, a space system called Navstar can constantly provide him with his position within 30 feet and his velocity within a foot per second, regardless of weather conditions, geographic location or time of day. With this type of positioning, a pilot can then do a pretty good job of delivering firepower on target - certainly with more efficiency and confidence.

Relatedly, we all know how important it is to communicate during battle. The ability to transmit and receive data from over the hill and beyond has always been self-evident in importance. Using space we have, in many cases, abandoned short wave and taken advantage of UHF, SHF and EHF, giving us added assurance our communications will be timely, reliable and effective.

Another striking advantage offered by spacecraft orbiting overhead is the direct line of sight access to any part of the world. For the first time in history we now have the ability to collect information regardless of geographic location or boundaries. This advantage and capability becomes magnified when one considers the United States is being denied more and more observation posts around the world. The usefulness of space

systems for monitoring arms control treaties, nuclear test bans and conducting surveillance for national security has been voiced by more than one president and senior officials of the executive branch.

It can be said that space systems are becoming - if not already - the fourth element in our strategic arsenal, joining the ICBM, the penetrating bomber and the submarine in providing the country's front line deterrent to war or geopolitical encroachment.

These examples illustrate what is important to the ships, squadrons and battalions as well as their command elements that exercise operational control. But what is most important to the customer - the commanders and operating units - is that they be able to receive the radio signal, known in today's jargon as the bit stream, from space whenever they want it, whereever they want it and with total certainty that it be there when they need it. And this is a formidable challenge. It is, by far, the most vital one confronting our military space program today.

Let me briefly outline what I perceive to be the three central doctrinal issues that deserve debate during the course of your sessions--issues that could collectively lead toward a doctrine that outlines the priorities and requirements that must be met to insure that bit stream is always available.

The <u>first</u> issue is the ability to use space in time of war. This demands survivability of space assets. The issue is how and to what extent that will be provided.

Do we do this by an ability to reconstitute in war? We cannot do this today. We are not sure we know how to do this. An alternative is to build an orbital force structure in each mission area that is designed for the survivability that each mission area needs.

We do not have this today.

Our space programs do not have the production or orbital depth needed to handle even peacetime attrition factors.

We have got to address this issue before we can expect our major force commanders to count on the use of space systems in war.

We simply cannot accept the program fragility we experience today as a way of life.

The second issue is how to apply the use of spacecraft to ships, squadrons and battalions. Space is the high ground that allows another arena of communications. If we can define the requirements and architecture, we can get on with the development of terminals and space assets to remove the current line of sight limitations that encumber our aircraft, ships and battalions.

A third doctrinal issue is command and control. If a commander is going to depend on a space system, then he wants to control it. Today, command and control of space systems is scattered among various users. We can have a more effective and reliable approach to $C^2$ if we develop a doctrine that will, in turn, generate the full spectrum of military user requirements, both present and planned. In this area, we have made a significant stride forward with the AFSATCOM program, where our nuclear capable forces - B-52s, FB-111s and Command Centers - are equipped with AFSATCOM terminals. The AFSATCOM is the first military comm system that permits direct access and information flow between ultimate users and command centers which manage and control the spacecraft payload. This approach eliminates the need to channel information or directions through another center like the Satellite Control Facility. Our experience on this program can point the way toward developing a doctrine that addresses this issue.

Let me conclude my remarks today with a suggested approach to developing a space doctrine that might, in the long run, be less painful than that experienced by the evolution of airpower doctrine in the twenties and thirties. I would preface this by remarking that I believe that in space today, we are about where we were in the Army Air Corps in 1938. We have a modicum of capability. We think we know what to do. We think we know how to do it. We don't yet, however, have the wherewithal - the direction - to get there.

But consider this - recognizing that routine access to space is still a long way off - despite the promises of the space shuttle:

If we can define an orbital strategy which centers on the concept of building a force structure designed for depth and survivability, then we are, for one, solving the problem of moving the spacecraft bit streams with confidence to our users.

Such a strategy would, in turn, generate launch requirements for launch vehicle buildup and spacecraft replenishment.

From this we could then define the production strategies and obtain funding resources needed to maintain a stable acquisition cycle that takes into consideration launch and orbital failures.

If we can put our thoughts together on what constitutes our strategy for an orbital force structure, then we will have defined our objectives. As a by-product such a strategy would probably reflect a doctrine.

What is important is that we move out in thinking our way through the basic strategy and doctrine for the military use of space.

The alternative is to be captured by the technologists and the systems that they develop. I sometimes think that we are in that situation today.

I offer this quote from General Hap Arnold: "National safety would

be endangered by an Air Force whose doctrines and techniques are tied solely on the equipment and process of the moment. Present equipment is but a step in progress, and any Air Force which does not keep its doctrines ahead of its equipment, and its vision far into the future, can only delude the nation into a false sense of security."

I believe the time is right to get on with doctrine and strategy and extend my compliments to those here who had the foresight and wisdom to convene this symposium.

The development of a space doctrine would help us develop a reliable space program that is essential to maintaining international stability in this "Dangerous Decade."

We can do better.

We need to do better.

We should do better.

And I think we will.

Thank you for the opportunity to share my thoughts with you this morning.

# Proceedings

## III. PROCEEDINGS

# Panel 1

# U.S. Space Operations Doctrine

## PANEL 1 SUMMARIES

### INTRODUCTION

The charter of Panel 1 was to lead a roundtable discussion of the past, present, and future aspects of military space operations and their relation to military space doctrine. In order to provide a breadth of discussion and a free flow of ideas, a set of three very general questions were provided for each of the chronologically based roundtable sessions.

During the discussions in a given roundtable session, some points relevant to questions of other roundtable sessions were discussed. Where this occurred, an attempt has been made to document these points under the more relevant roundtable session. No attempt has been made to present points in a chronological order of discussion within a given roundtable session.

### ROUNDTABLE 1A

1A1 - What key factors brought about the initial efforts to develop, deploy, and operate military space systems?

Items of Consensus - A strong consensus was reached by roundtable members on three factors in answer to this question. The first and probably most important factor was the Soviet Union's launch of Sputnik on 4 October 1957. This event and its attendant political and military implications created an atmosphere of threat or perception of threat to the future security of the United States. This threat or perception of threat provided the primary impetus for the development of space systems — both civil and military. It also created a situation in which almost everyone in or out of the government advocated the development of space systems. The second key factor was the lack of monetary constraints on the development of these systems. The perception of threat and the urgency to catch up eliminated

virtually all obstacles to funding for these systems. The last key factor was not as well defined as the first two. It involved a feeling by most of the roundtable members that the "time was right" for the development of these systems - threat or no threat. It was felt that sociologically, economically, internationally, and possibly most importantly, technologically, we were ready for the development of civil and military space systems.

Other Items of Discussion - The question of "technology push" as a key factor was discussed to some extent, but there did not appear to be a consensus on this point. Most participants felt that isolated from other factors, technology alone did not push us into the initial development of space systems. Another pertinent area of discussion was the attempt by some roundtable participants to draw analogies between the development of the airplane and the development of space systems. The most important conclusion reached in these discussions was that before applying airplane analogies to space systems, one must understand the factors that are unique to space. (The proper perspective on such analogies may have been stated by Mark Twain: "History does not repeat itself, but it rhymes.") The last significant point discussed during this session was that during this early development period of the 1950's, the Air Force was pushed into space by national requirements formulated by the highest levels of government; the top levels of the Air Force were not pushing the Air Force into space. An important subpoint of this discussion was the implication that the Air Force hierarchy has never pushed for the Air Force to be involved in space and likely never will; however, there was no consensus on this view.

1A2 - How did the military space missions evolve?

Items of Consensus - The point of strongest consensus was that space systems and missions have evolved in a monolithic manner based primarily on an

inductive, incremental process. This type of development resulted in space systems and missions that were neither the most efficient nor the most effective. Now and in the future, a deductive approach should be used to develop military space systems and missions. (By "deductive" approach the author is referring to systems and missions being determined in a comprehensive fashion consistent with national objectives, strategies and force employment doctrines. – Ed.) The second point of general consensus was that space has been developed primarily in a support role for terrestrial systems. Most people believed that up to the present time, this has been a valid premise for the direction of military space systems and mission development. A subpoint of this discussion with which most people agreed was that this rationale for development may be only partially adequate for the future – that is, the military capability to control space may become nearly as important as terrestrial control. The last point of consensus evolved from a discussion of why Systems Command has responsibility for space operations. Simply stated, in the beginning of space systems development, space operations were an unknown of tremendous technical sophistication, requiring engineers to accomplish almost all space operations tasks. The logical choices for these tasks were personnel from those organizations that eventually became Systems Command. No one argued against the validity of this point.

Other Items of Discussion - Two other items were actively discussed in relation to this question. The first was what has been the level of participation of operational users in the development of space systems. Some members of the roundtable felt that there had been very little involvement while others felt there had been a moderate amount of participation. No consensus was developed as a result of the discussion. The second item

discussed was a statement to the effect that intelligence and technology people have been the primary drivers behind space systems development with little other involvement. As with the first point, no real consensus resulted from discussions of this statement.

1A3 - What are the key lessons that have been learned during the evolution of military space systems?

Items of Consensus - There were many points of consensus in the discussion of this question, some of them reaffirming or modifying agreement on issues already discussed. A strong consensus was evident for the first lesson learned—that a threat or a perception of a threat to our national security was a key factor in the decisions made to develop military space systems. The implication was that now and in the future we must try always to understand the threat and use it as a key element in the decision process. The second lesson, closely related to the first, was that because of the threat or perception of threat, there were no significant financial constraints on development. This factor greatly eased the development of space systems. It was also noted that since "fenced funds" were used, there was no budgetary competition between space systems and other Air Force systems. The third lesson learned was the fact that political, economic, socioliogical, international, and many other factors have had an effect on the development of both civil and military space systems. There was consensus on this point, but no detailed development of key historical events relating these factors to space systems development. The fourth lesson learned was that there has been a definite lack of education of those in the upper ranks of the Air Force and of the public as to the possibilities and importance of space. Many people felt that this lack of education could have been a key factor in the lack of advocacy for space within the Air Force, the DoD, and the country as a whole. Subsequent discussion along these

lines resulted in a consensus on the fifth lesson learned—that this lack of strong advocacy definitely inhibited the development of space systems and missions. The sixth and seventh items of consensus on lessons learned developed from discussions attempting to draw analogies between the development of airpower and space systems. The sixth lesson learned was that doctrine must be alive and evolving: it cannot be a dogma. The seventh lesson learned was that no system has existed to generate space doctrine through a dialectic process. As a result, there is currently no coherent doctrine for space. The implications of this seventh lesson will be discussed in more detail below.

Other Items of Discussion - Many other statements made by members of the roundtable were discussed at length, but not to a point of consensus. For example, some argued that historically there has been a technology push instead of a doctrine pull in the development of military space systems. The discussion of this statement led to a general feeling that in the future we need to keep doctrine ahead of technology rather than allowing our technical capabilities to determine our course in space. Another general discussion concluded that doctrine and the development of doctrine were very important to our successful use of airpower in World War II and that doctrine may eventually be the key to our successful use of space. In this area, it was felt that the airpower analogy was most certainly appropriate. Quite a few people also expressed the feeling that the process of just trying to develop doctrine was probably a worthwhile endeavor. Going through the process required thinking and talking about the subject and thus results in considerable communication and education of those involved. The last item of discussion was the role organization (USAF and DoD) has played in the development of military space systems. No consensus was reached on this topic, but the view was expressed that organization did play a defi-

nite role in advocacy and thus was definitely a factor. Some people felt this relation and its effect were shown dramatically in the growth of airpower and that to a large extent, the analogy would hold in the development of military space systems and missions.

ROUNDTABLE 1B

1B1 - What are the challenges to military space operations today?

Items of Consensus - The first item of consensus evolving from the discussions of this question was that today there is no real advocate for military space systems—not within the Air Force, the DoD, or anywhere. Advocacy or the lack of advocacy were felt to have major impact on military space systems development. There was a general consensus that the lack of a strong advocate was the primary cause of many space system funding problems and the lack of coordination on where we should be going in space. There was also a limited consensus on the role of organization in advocacy for space. Most agreed there was a connection, but no definitive agreement emerged on the details of the connection. It was noted, however, that at the present time the Air Force is not the DoD executive agent for space. (Discussion and recommendations on space systems advocacy for the future will be treated below.) A point of limited consensus involved a statement concerning lack of education. The general feeling seemed to be that understanding space, both as a medium and in terms of its potential for use, was very difficult for many people, especially in comparison to understanding the functions of airplanes, ships, and tanks. This is one area that may very well lend itself to an anology with the lack of understanding exhibited in the early development of the airplane. A prevalent opinion seemed to be that moving from air to space required a bigger jump in understanding than from ground to air. As far as who lacks the understanding,

those mentioned included senior military and civilian presonnel in the Air Force and DoD, members of Congress, and the "man on the street." There was a definite feeling that education would be a key element in the development of future support for military space systems. The next item of consensus was that the "space choir" of advocates must get together and start singing the same tune before going out and trying to broaden support for space systems. The proponents of space must get together and develop a unified position on where we should be going and how we can best get there. The last item of consensus was that space systems must provide assured operational support to their users. There was very strong consensus on this point and that today's systems do not necessarily provide assured support. A number of people pointed out that, depending on the scenario and level of conflict involved, many of today's space systems are not capable of survival and thus cannot be relied on to provide assured support to the user. This discussion led to the development of the following statement that for the most part reflected the feelings of the roundtable: "Our military space assets must be able to provide assured assistance to the national command structure and to the air, ground, and naval forces, enabling them to perform their assigned missions in support of national policy and in defense of our nation. We must be able to protect our ability to perform this function. We must also anticipate the future and be prepared to deny an enemy the ability to perform these same functions."

Other Items of Discussion - At the opening of this session, the panel made a statement to the effect that present military space systems really work pretty well. They are getting the job done. They also noted that we should be very careful in initiating anything doctrinally or organizationally that would disrupt what we have today. There was little or no discussion of

these points and thus no consensus was forthcoming from the roundtable. The next item of discussion concerned a statement to the effect that today (and in the near future) the role of military space systems is the support of terrestrial systems. For the most part, people agreed with the statement in general, but could not agree at all on what time period was represented by the "near future." Some people felt that the support role would be prime for the next 20 years while others thought that within five years space would have a mission of its own. The next item discussed was the involvement of operational commands and other users in the planning and development of space systems. Some roundtable members felt that today's involvement was about right, while others thought that the level of participation should be increased drastically. In what areas and when the involvement should occur was also discussed briefly, but no consensus resulted. Some also felt that there were not enough operational users attending the roundtable to discuss the subject properly and arrive at consensus on issues related to user involvement. Another subpoint of this discussion that should be noted was that security classification or compartmentalization of information has sometimes inhibited any involvement by users in some programs that may have had great potential to that user. The very general feeling held by members of the roundtable seemed to concur with this point, but since the symposium was held at an unclassified level, it was impossible to discuss the matter in detail or reach a real consensus on the issued involved. The last item of discussion lacking a consensus was the view that the Air Force has not accepted space as its mission, primarily because requirements and associated missions are nationally oriented, not Air Force oriented. Many concurred with the statement and many didn't, depending on their interpretation of who in the Air Force accepts or doesn't accept space as a mission and what the space mission is supposed to be.

1B2 - What will be the near term (1980s) impact of the Space Transportation System on military space operations?

Items of Consensus - Two items in the discussion of this question attained a level of consensus. The first item was a statement to the effect that the space shuttle in the near term is not just a space "truck", but is a vehicle that will be utilized as a learning tool in the development of manned, military operations in space. There was a strong consensus on this point. Most members of the roundtable felt that the present Space Transportation System was just the first step in the development of routine operations of space, both military and civilian. The second item of consensus was a fear by many members of the roundtable that the proposed near-term use of the shuttle effectively puts "all our eggs in one basket" and that we should definitely develop an expendable launch vehicle backup for systems key to our national security; however, no detailed, specific alternatives were discussed.

Other Items of Discussion - Two other items are worthy of note. The first was the view that through the early 1990s, the shuttle will actually be able to do less than we can do with existing expendable launch vehicles. It was also argued that we must develop better utilization of the shuttle during this period in order to attain a military capability to operate the shuttle independently of NASA. During these discussions, it was apparent that no real consensus emerged on either o' these statements.

1B3 - Does (or should) a doctrine exist for current military space operations?

Items of Consensus (Does doctrine exist?) - The discussions that developed around this question covered a wide variety of positions (some very general and others very specific) on the existence of space doctrine. The conclusion that must be drawn from these discussions, however, is that absolutely no consensus developed concerning the existence of doctrine for

current military space operations. Even though no consensus emerged on this issue, it is also true that there was no clear, concise, common understanding of doctrine among the members of the roundtable. Many attempts were made to provide specific definitions of doctrine, but no agreement was reached. Some general views on what characteristics doctrine should possess did gain consensus and will be discussed later in this section; however, the lack of a common definition was apparent in almost all roundtable discussions of doctrine during the entire symposium. This problem must be addressed and resolved before a serious attempt can be made to develop space operations doctrine.

Other Items of Discussion (Does doctrine exist?) - Some members of the roundtable felt that doctrine does exist today and that we should be using it. Most of these people felt that basic doctrine for space exists in Presidential Directive (PD) 37 and AFM 1-1, and that operational doctrine exists in the form of AFM 1-6. Quite a lot of discussion was conducted on these points, but no consensus resulted. Defining doctrine, policy, and strategy, and specifying their relations to one another was a major problem in reaching a consensus. (An important item to note is that at one point in these discussions the roundtable participants were asked to raise their hands if they had read the latest draft AFM 1-6. Of approximately 130 people, only 50 raised their hands. Thus, most participants did not have the background to discuss the implications of this document; why so few were familiar with AFM 1-6 remained unanswered.) The last item of interest concerned a statement that airpower doctrine does exist today, but that it is hardly used. No real discussion developed but this question eventually has to be answered. An assessment of the utility of airpower doctrine could provide a basis for understanding the use of future space doctrine.

A possible reason why no vaible discussion developed on this point was the lack of roundtable members from airpower organizations that would be in a position to attempt an answer. A discussion of participants for future symposia will need to address this problem of airpower representation.

Items of Consensus (Should doctrine exist?) - A general consensus of the roundtable appeared to be that there is an urgent need to develop a military doctrine for space. Because of the problem of defining doctrine, however, it was difficult to assess what this general consensus meant in terms of actually developing doctrine for space. A somewhat weaker consensus did emerge on specific characteristics that doctrine should possess. The first key characteristic was that doctrine should be a shared belief that is always alive and evolving, not dogma. The second characteristic was that military space doctrine must conform to basic national policy. The last item of consensus was that the process of developing doctrine is very important in itself. Most members of the roundtable felt that doctrine development was similar to the process of planning albeit on a different level. Indeed, the planning process that necessarily involves people and their organizations may at times be more beneficial than the final product. Some suggested that a unique organization should be established to develop space doctrine.

Other Items of Discussion (Should doctrine exist?) - Roundtable participants addressed at some length the problem of how national policy is translated into DoD and Air Force policy or doctrine. Many points of view were presented during this discussion, but no consensus developed on any of them. One individual presented a chart to the roundtable with his approach to the relations between policy, doctrine, and other key elements associated with this problem. No consensus was reached on his approach,

but it is presented here as a possible point of departure for future discussions.

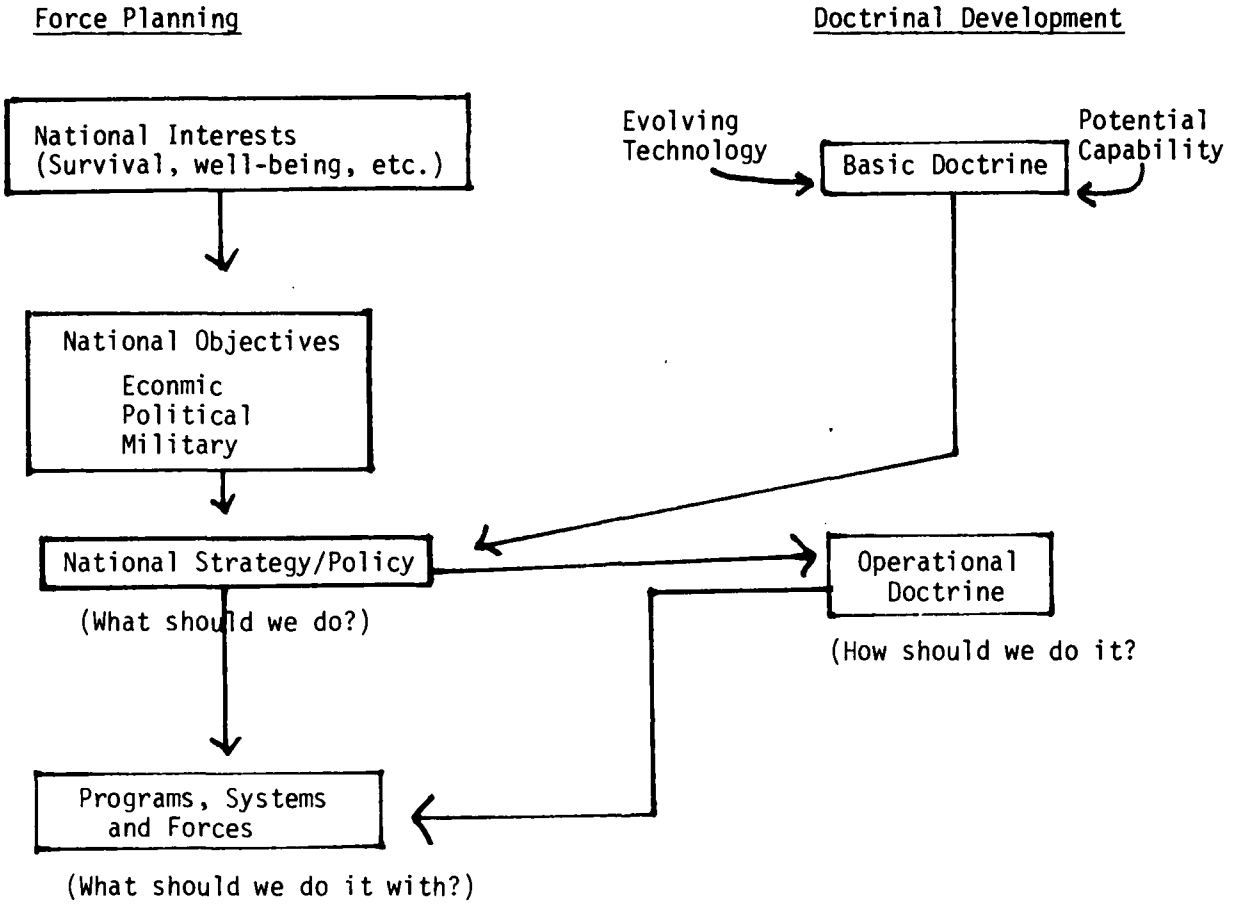


Figure 4 Doctrine Flow

The last significant item of discussion was trying to understand how space doctrine and its development should be related to the Joint Chiefs of Staff (JCS). Present space systems seem to have few connections with the JCS and thus their use as assets in a wartime situation is very ill-defined. Many also felt that the Air Force should take the lead in getting a strategy and doctrine for space properly coordinated with the JCS system.

ROUNDTABLE 1C

1C1 - What will be the future roles of (and challenges to) military space operations?

Items of Consensus - Many discussions in roundtable 1C as well as the other roundtable sessions focused on future roles and challenges. All of the consensus items concerning these future roles and challenges will be presented here. Unless otherwise noted, each of these items represented a fairly strong consensus from the roundtable members. The first item of consensus was that the terrestrial support role that space now fulfills must be continued in the future. The future challenge will be to increase the support capabilities for such present missions as weather, surveillance, communications, and navigation, and also to develop new, more useful support missions. Increasing the capabilities of present space missions would include technology advances in sensors, control systems, autonomy, command and control, and many other areas. Increasing the survivability of all segments of space systems will be a challenge of key importance. New support missions from space could include ASAT and ABM systems. The next item of consensus was that a combat role in space will evolve in the future. The subpoints of this item were that we will need to develop a space combat capability to protect our national interests there, to deny domination of space by a foreign power, and to project a peaceful image of our power in an effort to maintain world peace. Consensus was also reached on the view that we will not only be protecting military assets in space, but also civilians. By the time the combat role in space evolves, it was felt that many of the systems in space will still be commercial. Many historical analogies can be presented that link the development of military capability to a requirement to protect commercial interest. Another point of consensus, although somewhat weaker, was that there should be a military role in the future exploration of space. An historical analogy was made to the key role of military participation in the expansion and development of

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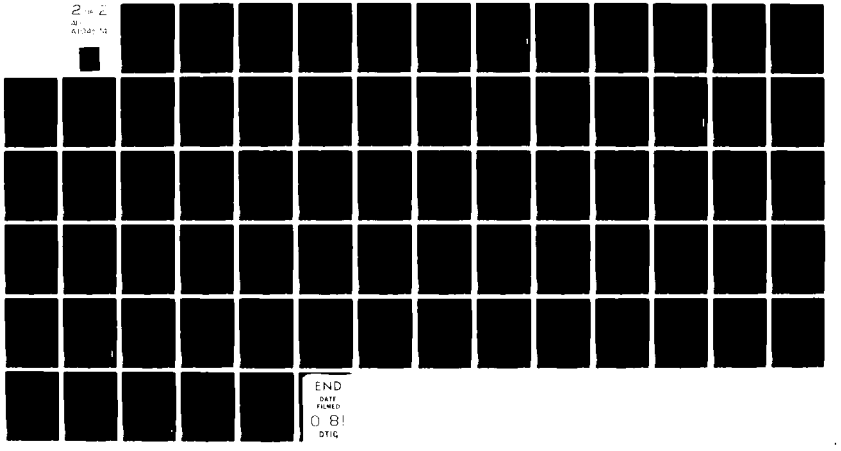

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the western U.S. in the 1800s. A fairly strong consensus developed from a discussion of technical challenges to future space systems. The first of these was that it will be necessary to do many future missions from higher and higher orbits, primarily to enhance survivability. The second was that for many reasons, future space systems will require extremely high levels of autonomy from earth-bound command and control. Accomplishment of these two technical challenges was felt to be of great importance to the ability of future military space systems to perform their missions.

Other Items of Discussion - Four other important points were discussed, but were not supported sufficiently to be considered the consensus of the group. The first was that the Air Force must seek a clear mandate as the executive agent for space combat operations. The second was that the space war fighting roles of defending all U.S. space vehicles and offensive missions must be assigned promptly to Air Force units. The third point stressed that the U.S. must develop hardware to accomplish both offensive and defensive space combat operations, even if doing so requires the abrogation of existing treaties. Lastly, the Air Force will not achieve any of these things until it accepts the necessity of developing an advocacy role for both offensive and defensive roles in space.

IC2 - What will man's role be in future military space operations?

Items of Consensus - The discussion of this question focused on two time periods, near term and long term. Unless otherwise noted, the points of consensus described in this section received a very strong endorsement by the roundtable members. The first point of consensus would have to be that there definitely is a role for man in space. No one actually stated this

explicitly, but it would easily be inferred from the discussions. In general, most people felt that in the near term, man could definitely enhance performance of many of the military and civilian missions anticipated for this period. In this role, man would be utilizing his cognitive and judgmental abilities to make real-time decisions and take appropriate action. As far as near term roles, the consensus was that man will be needed to accomplish the retrieval of old or damaged spacecraft, repairing them in space. Another specific role will be construction in space of large space structures. These two specific roles appeared to be selected by the roundtable participants as key roles for many future missions in space. Another specific item for the near term was that every effort should be made to "routinize" space operations. We must eventually make it such that the "ordinary man" will be a part of space, not just specially trained astronauts. A general conclusion for near term roles was that man's primary role in space will be to learn. What man learns in and about space in the near term will be the building block for the development of space systems and missions that are today beyond the realm of man's imagination. Concerning long term roles, two specific items received strong backing from the roundtable members. The first was the view that a key role for man in space would be the development of a large manned space station. Many people thought that the development of a manned space station should be a key goal, if not the key goal of our long term space program. No specific military or civilian applications for a manned space station were discussed, but it was noted that many missions could be performed from this type of platform. The second long term role for man was his use as a pilot for what was termed an "aerospace plane." This vehicle would have the ability to take-off like an airplane, transition through the atmosphere to space, and then be able to return and land as an airplane.

Long-term development of these two manned technologies would lead to the optimum use of space for civilian and military purposes. One last point of consensus must be noted. The roundtable was in strong agreement that even though man's role in space will continue to grow, there will always be space missions that can best be accomplished by unmanned systems. No attempt was made to decide which missions will require man and which won't, but everyone agreed that future space operations would involve a mix of manned and unmanned systems.

Other Items of Discussion - None. Roundtable members reached consensus with little, if any, dissent on the role of man in space.

1C3 - Should doctrine be developed for future military space operations? Who should develop it?

Items of Consensus (Should doctrine be developed?) - A number of items of consensus developed from the discussions of this question. The first, and possibly the most strongly supported, was that there should be a space doctrine developed to guide future military space operations. As to the nature of this doctrine, many specific and general points were discussed. Most of these discussions brought up the same doctrinal characteristics that have already been discussed above. The item that developed the strongest consensus was that a doctrine should be developed that allows for the control of space. Most of the people participating in the roundtable felt that control of space should be the primary goal of future military space systems--that (as stated above) "our military space assets must be able to provide assured assistance to the National Command Structure and to the air, ground and naval forces, enabling them to perform their assigned missions in support of national policy and in defense of our nation;" that "we must be able to protect our ability to perform

this function;" and that "we must also anticipate the future and be prepared to deny an enemy the ability to perform these same functions." These statements advocate the control of space, given the near term role of terrestrial support. A statement of long term doctrine would have to include the ability to control space in terms of all missions, not just terrestrial support. The next item of consensus was that procedures for the development of space doctrine should be developed. This point received strong support from roundtable members. As has already been stated, there was also a strong feeling that just the process of developing doctrine would be very worthwhile. It was also agreed that a draft military space doctrine should be developed as soon as possible for wide circulation. Hopefully, this draft doctrine would encourage strong debate within the Air Force and eventually lead to a coordinated military space doctrine for future space operations. There was also agreement that the developed doctrine should be a forward looking statement; however, there was no attempt to state specifically how this process of doctrinal development would take place and who would accomplish it. The question of"who and how"may be very appropriate topics for future symposia on military space doctrine. The last item of consensus was a recommendation by roundtable participants that this symposium be repeated every year or two and that the format and approach be reassessed.

Other Items of Discussion (Should doctrine be developed?) - Some very interesting items arose from these discussions, although they were not consensus views. The first item was that maybe we should not talk about offensive and defensive weapons in space, just about strategic weapons. Many people noted that in today's atmosphere any discussions of offensive weapons in space seems to cause immediate problems for many people and organizations. To get around this,

we should talk about strategic weapons in space that can have a dual role, depending on their technique of utilization. This point created a lot of discussion, but no real consensus emerged from the roundtable. A subpoint of this discussion that should be mentioned was a statement to the effect that we should not let treaties impede our development of future space weapons. This point came up many times during the symposium, but there never was any consensus on this issue. The last item of no consensus was that there has been a definite lack of response within the corporate Air Force to a draft doctrine on space (AFM 1-6, for instance). It was felt that user response was especially lacking. Some noted that the response to AFM 1-6 was similar to the response to the Moon Treaty. Discussion of these points was mixed in perspective and resulted in no consensus of opinion.

Items of Consensus (Who should develop it?) - No consensus was developed on who should be the prime mover in the development of military space doctrine. The results of the discussion of this question are presented in the next section.

Other Items of Discussion (Who should develop it?) - Addressing this question resulted in some very interesting discussions, although no consensus. The common area of all these discussions was organization. What organization within the Air Force and for that matter, the Department of Defense, should be the OPR for the development of military space doctrine? Some roundtable members felt that organizations in existence now are responsible for accomplishing development of space doctrine, but some also felt that a new organization should be created for this purpose. Quite a few people felt that the Air Force should really take the lead in developing space doctrine, but certainly not everyone agreed. Some felt that development of space doctrine should be the job of a new organization,

a space command within the Air Force, while others felt that a new service, the U.S. Space Force, should do it. Another suggestion that was really not discussed would be the establishment of a Space Operations School along the lines of the old Air Corps Tactical School. In general, it was felt by most members of the roundtable that an answer to the question of who should develop space doctrine is of paramount importance to the development of future military space systems. This question should definitely be included for discussion in future symposia on space and space doctrine.

# Panel 2

# U.S. Space Organization Doctrine

## PANEL 2 - U.S. SPACE ORGANIZATION

### INTRODUCTION

This panel investigated organizational aspects of the U.S. space program from the historical, contemporary, and forward-looking perspectives. The panel chairman advised members and participants to operate like "loose cannons on a pitching deck", in a jocular vein, but his intent was to establish an uninhibited debate protocol, and the spirited exchange of sometimes diametrical views bore testimony to his success.

Instead of distinguishing between near-term (current) and far-term concerns, a single set of questions incorporating both timeframes was addressed at the latter two panel sessions (2B/C). No attempt has been made to report every substantive comment made, but great care has been taken to portray faithfully the main lines of these deliberations.

PANEL 2

Discussion. The chairman provoked the opening panel session by contending that "organization [for space] is not the problem; rather, "what should we do in space?" is the precedent issue. The underlying proposition that organization structure should follow from the articulation of strategy and doctrine is well founded in prevailing theories of organization design. Taken alone, this suggests that structural determination ought to be deferred pending the emergence of coherent doctrine with clear implications for strategy. This notion was implicit in positions taken by certain members and participants, but tended to be obscured in the intensity of the debate on immediate creation of a Space Command.

The Space command debate was also largely polarized with one faction favoring immediate fulfillment, and the other rejecting structural alterations in favor of procedural changes. Perhaps because government organizational arrangements, once established, tend to remain relatively constant, few intermediate alternatives were conceived. For example, with respect to the advocacy of space, proponents of a command saw enhanced advocacy as justification while opponents opted for stimulating advocacy from operational commanders by demonstrating important space capabilities, but no other avenues were explored. In the commercial sector, it is no accident that corporate boards of directors are heavily staffed with executives from financial institutions. The analogous idea that operational commanders could sit on what amounts to space organization "boards" is not a familiar military structural option, but intriguing nevertheless.

The polarization of views on the feasibility of a space command structural solution is not reconcilable on its face--that is, each position is logical, given the validity of its premises and assumptions and the priorities

Discussion (cont.)

assigned to various causal factors. Since many of these factors are themselves dependent on such future occurrences as technological advances and moves by potential adversaries, they cannot be "known" or foretold with accuracy. Nevertheless, it seems prudent to recommend that ensuing debate focus on a critical examination and testing of the forecasts that underlay each position, a process perhaps best conducted via futurologic methods like cross-impact matrices, scenario building, and Delphi panels. Such methods do not guarantee consensus, but they do force the participants to confront the reasonability of the foundations of their arguments, rather than simply allowing the current debate to continue ad infinitum, probably without result.

2A-1. What historical parallels exist between the emergence of airpower and spacepower as an exploitable military capability? What are the differences?

The panel acknowledged that both airpower and spacepower were initially exploited in the support roles of surveillance and communication. Airpower evolved beyond these support missions to include critical and unique weapons delivery missions such as strategic bombardment. While spacepower has not yet emerged from the support stage, its great potential is recognized. Just as the era of airpower began with aeroplanes "killing" other aeroplanes, it appears likely that satellites will first develop the capability to "kill" other satellites (anti-satellite or ASAT systems).

A panel member argued that the distinctly different physical properties of air and space affect their use as media for military operations. The core technology of powered flight, though new, was not as highly complex as space technology. Man accompanied his machine into the air, finding flexibility in the medium that facilitated its use for military purposes. By contrast, space flight is extremely technical, beyond the ken of the average man, and until now most missions have been unmanned. Space systems are fragile and orbits are relatively inflexible; thus, current exploitation of the medium for military purposes is more difficult.

2A-2. What organizational parallels can be drawn between the development of airpower and spacepower? What are the differences?

The panel recognized that in both air and space early organizational subordination was experienced. Airpower was initially subservient to ground and naval forces just as spacepower is now subordinated to air and naval forces, as well as non-military applications. Consequently, advocates of each have encountered significant organizational inertia and resistance to promoting their cause.

A panel member cautioned that the "Billy Mitchell analogy" of airpower advocacy not be so overdrawn as to become a cliche because, in fact, Mitchell's vision was not realized in the short-term; General Patrick's more evolutionary course was adopted instead. The panel member also rhetorically asked, "Who are the brown shoes today?", a reference to the intransigent opponents of airpower. He added that there are no significant "brown shoes" with respect to spacepower.

A participant also pointed out that Boeing and other private firms played a significant adjunct role in the development of airpower, but that the high cost of space systems largely precludes such private development.

2A-3. Can we apply lessons learned in the development of airpower and the organizational structure which supported (or impeded) this development to the development of spacepower and its supporting (or impeding) organizational structure?

While a panel member observed that the military tends to organize new warfighting media like old, more familiar ones, the tenor of discussion reflected the view that the lessons drawn from history depend heavily upon its interpretation. Proponents of the immediate creation of a new and dedicated organization for space tend to view the organizational development of airpower as having been haphazard and disjointed; the lessons learned are perils to be avoided. On the other hand, those who counsel against radical organizational surgery tend to interpret airpower history more as a model worthy of emulation.

There was general recognition, however, that airpower development had demonstrated the considerable trauma associated with introducing a new medium and mission into the military force structure. The value of warfighting applications, especially weapons delivery capability, facilitated acceptance of airpower. Strong advocacy by the proponents of airpower was also imperative.

2A-4. What factors shaped existing USAF space organizational structure (i.e., heavy AFSC involvement, functional mission assignments, technology, budgets, individuals, vested interest groups)? Are these factors still relevant?

One panel member noted that official Air Force doctrine contained in AFM 1-1 portrays air and space as a single arena, a conceptualization that contributes to program fragmentation by aligning management responsibilities with functionally similar non-space activities. Sometimes this also results in arbitrary organizational assignments because of imprecise functional alignment between space and non-space activities (e.g., assignment of Space Defense and NAVSTAR PPS to SAC). AFSC ownership of the space operations infrastructure (launch complexes and ranges, satellite control facilities and command sites) and the highly complex technology associated with space systems, requiring continuing hands-on support from technically trained and specialized personnel (both military and contractor) also drove the organizational system, according to the members.

The single arena doctrine still prevails, but is being challenged by "space power separatists" who advocate space as a distinct military arena and argue for consolidating the currently fragmented control of Air Force space operations and resources. AFSC involvement will likely continue, but space technology is becoming more commonplace, alleviating the need for intensive contractor support.

2B/C-1. In light of the increasing use of space for military purposes by both the US and the USSR, as well as the advent of the STS, do defense and civilian space-related roles need to be redefined?

a. Does the Aeronautics and Space Act of 1958 still provide an adequate legal framework for the near-term and far-term military and civilian space programs? If not, what are the problems and how can they be resolved?

b. Do PD/NSC-37 and PD/NSC-42 provide an adequate near-term and far-term national policy framework for these programs? If not, what are the problems and how can they be resolved?

The consensus of the panel was that in view of the growing US and Soviet dependence on space to support and conduct military operations, as well as the growing interdependence of NASA and DoD caused by the advent of the STS, defense and civilian roles in the US space program may need some near term readjustments. For example, given military dependence on NASA for shuttle payload launch, crisis or wartime conditions would undoubtedly lead to changes in priorities between civilian and space roles. On the other hand, the present legal framework is adequate. In this regard, the Aeronautics and Space Act of 1958 must be interpreted to permit weapons systems in space: while weapons of "mass destruction" are proscribed, the "right of free passage" in space is guaranteed, a provision that implies a requirement to develop and maintain a military capability appropriate to the task of assuring "free passage." With respect to the PDs, no substantive criticism of content was offered, but failure of the services to implement and exploit the opportunities presented by them was noted.

2B/C-2. Are the current space-related roles of the constituent DoD organizations adequately and appropriately defined?

a. Does DD/5160.32 provide an adequate framework for the near-term and far-term military space program? If not, what are the problems and how can they be resolved?

b. In both the near-term and the far-term, does the DoD need an executive agent for the military space program? If not, what are the problems and how can they be resolved? What problems would this create? What duties would the executive agent be assigned?

c. Should the Air Force be designated the executive agent for the military space program. Why or why not?

The organizational framework imposed by DD/5160.32 was not discussed directly, but the issue of an executive agency did stimulate considerable discussion. The panel considered only the Air Force as executive agent for the military space program. Consensus was not achieved, but many felt that such a step is highly desirable, if not imperative, to reduce role fragmentation and marshal advocacy. Tempering views focused on the traumatic implications of the revised PPBS scheme, and more particularly on the notion of exclusivity of the executive agent. There was confusion as to whether or not the Navy officially favors the Air Force as executive agent for space. In any event, it was felt that the Navy does not condone the concept of the Air Force as exclusive agent; they also observed that interservice disagreements on such matters would impede military space advocacy. Several participants commented on the possibility of joint operations in space within the organizational context of a specified or unified command, but no conclusion was reached on this point.

2B/C-3. Does the current Air Force organizational structure present any near-term or far-term problems in accomplishing assigned or emerging Air Force missions?

a. Would some current AFSC activities such as launch operations, test range operations, and on-orbit satellite control be more effectively handled by an operationally oriented organization? Why or why not? Does the STS effect the situation? If so, how?

There was general recognition that the current organizational system lacks a coherent doctrinal foundation and presents obstacles to space-mission accomplishment, given role fragmentation, the lack of integration with operations and the absence of systematic planning and advocacy. The majority saw important benefits from operational intervention in such traditional AFSC activities as enhanced advocacy, greater attention to the "-ilities" (reliability, maintainability, etc.), and better validation of requirements. On the other hand, a minority held that the continuing "technology-push" of space systems evolution mandated the status quo. A participant from an operational command argued that while the command must maintain the mission direction function, it has no particular need to retain the "satellite housekeeping" functions. It was also suggested that while it is premature to assess the STS impact, it will likely serve to define better man's role in space there.

b. Does the Air Force need a central focus for managing and advocating operational space resources and activities? If so, what problems would this resolve? Who should do it?

There was unequivocal consensus that a central advocate is key to military space development, to systematize space priorities, to compete in the funding allocation mainstream, and to facilitate procedural and organizational changes in the interests of space.

2B/C-3.b. *(cont.)*

The alternatives identified (in order of their acceptance by the panel) were establishment of an XOS organization, appointment of an Assistant Chief of Staff for Space Development, and the naming of a Commander for the Space Command -- the latter alternative being controversial, given the dispute over the need for a Space Command.

2B/C-3.

c. Does the Air Force need a centralized school for formulating and promulgating space doctrine? If so, what problems would this resolve? Who should do it?

The importance of stimulating learned thought leading to the development of doctrine was acknowledged by all, but views on the proper mechanism for doing this differed. The fear was expressed that if a centralized and segregated school were established, the "ivory tower" syndrome of doctrine divorced from reality might obtain. On the other hand, some argued that quality thought is produced best when isolated from the daily pressures of normal organizational life. Various "crucibles of doctrine" were postulated to include a space version of the earlier Air Corps Tactical School, a space-dedicated institution akin to the Defense Systems Management College, the Air University and, in particular, its Airpower Research Institute, the Professional Military Education system (Squadron Officer School, the Air Command and Staff College, and the Air War College), basic education and commissioning sources like the Air Force Academy, and the Air Staff analytical infrastructure. The possibility of a division of labor among these institutional elements was also raised in that each has an inherent compar-

2B/C-3.c. (cont.)

ative advantage in performance of the various doctrine-related tasks: a dedicated "think-tank" can best generate doctrinal innovations, the Air Staff can best validate them, and Air Force Academy and Air University elements can best disseminate the product of these efforts.

2B/C-3.

d. Does the Air Force need centralized long-range space operations planning? If so, what problems would this resolve? Who should do it?

e. Does the Air Force need a major command for space operations? What problems would it resolve, and create? What missions would it be assigned? How would the responsibilities be allocated among the space MAJCOM, AFSC, AFLC, AFCC, AFTEC, ADC, SAC, and TAC? How should it be brought about?

The issue of long-range space operations planning tended to be mixed with the need for a major command for space, the focal point for the most intense debate engaged in by members of this panel. The debate proceeded from the premise that in the long-run there will be a Space Command. Accordingly, discussion centered on whether it should be created now, or emerge as the logical culmination of an organizational evolution. Disagreement was irreconcilable; a polarity of views emerged. At one point, a strawman ballot was taken on the question; nineteen participants opted for immediate creation and nineteen for gradual evolution!

Those who favored immediate creation of a Space Command argued not only that such a move would lead to resolution of such problems as fragmentation, advocacy (mission and budget), and doctrinal development, but they also pleaded that if such a command is inevitable, it will be much more

2B/C-3.e. (cont.)

traumatic to create one later when emerging space missions have become entrenched in the existing commands. They foresaw space as the new warfighting "high ground" that must be seized and held by such a radical reorganization. In this scenario, AFSC would develop and acquire new systems to meet validated Space Command needs, AFLC would conduct depot-level maintenance, AFTEC would plan and conduct space system test and evaluation, and the space MAJCOM would coordinate with the other operational commands. By contrast, advocates of a gradual organizational evolution stressed that premature establishment of a major command for space could jeopardize space development by taking space-related functions and mission elements away from the other commands at precisely the time that a broad-based constituency of command advocates is needed for crucial activities like POM rationalization and submission. They posit that, lacking a compelling and undisputed case for change, the organizational status quo is appropriate, with certain procedural alterations to fix specific discrepancies. Related arguments were: the uniqueness of space and its emerging missions may require a unique organizational conception, while a regular MAJCOM is simply a familiar (but possibly inappropriate) structural solution; establishing a new command is an expensive proposition; moving too fast organizationally would engender prejudices in the other commands against the "junior" space command and its initiatives; there are not enough Air Force trained personnel for a space command complement; and the "whole man" promotion bias suggests that those devoting a significant portion of their career to a space command will not be competitive for promotion.

2B/C-3.

f. If the Air Force forms a MAJCOM for space operations, should an associated unified or specified command also be formed? What problems would this resolve and create? What missions would it be assigned? How would it be constituted?

This question was obscured by the strident debate about a space command, but the tenor of discussion was that space operations should be integrated into the unified and specified command structure so that space systems can be effectively employed in wartime. One participant felt that a specified command is appropriate so as to recognize space explicitly as a warfighting medium. Another advocated a unified command to include the Air Force Space Command in addition to Navy and Army space elements. No consensus was sought.

2B/C-4. How can this symposium help us solve the identified near-term and far-term organizational problems?

Since consensus was not reached on pivotal organizational issues, it was recognized that this symposium served more as a stimulus than a response. A panel member was adamant in his view that such a gathering of "space cadets" as was represented here is tantamount to "preaching to the choir"; any subsequent symposium should broaden its scope beyond the space community and invite the actual operational elements of other commands in lieu of their space liaison representatives.

2B/C-5. *Ultimately, will a separate service for space operations be called for? If so, why?*

The polar positions advanced on this question tended to be an extrapolation from the space command issue. Advocates see a space service as a natural concomitant of the articulation of space missions, while opponents feel that the issue is best deferred until an operational mandate is clear. One variant was the suggestion that a Space Corps could be attached to the Air Force as the Marine Corps is related to the Navy.

# Panel 3

# U.S.S.R. / International Space Operations and Organization Doctrine

## PANEL 3 - USSR/INTERNATIONAL SPACE OPERATIONS AND ORGANIZATION DOCTRINE

### INTRODUCTION

Panel Three was tasked with assessing the activities of the Soviet Union and other international actors in the space arena. As with the rest of the symposium, the three roundtable sessions were scheduled to discuss a series of questions within the historical, current, and future time frames. This was designed to provide a framework within which a broad flow of ideas and information could emerge.

The questions which were presented to the roundtables were:

History

1. What were the early objectives of the Soviet space program?

2. Did the Soviets develop a special doctrine for the military use of space?

3. How did the Soviets organize their space effort?

Current Activities (1975-1985)

1. What are the current objectives and major trends of the Soviet space program?

2. Does a special Soviet space doctrine exist? If so, what are its major tenets?

3. What is the current organization of the Soviet space program?

4. How do international law and the activities of lesser powers affect the superpowers?

Future Plans

1. What will be the long term objectives of the Soviet space program?

2. What will be the impact of additional countries entering the space arena?

3. How will the Soviets organize their future space efforts?

Rather than present a chronological description of exchanges that took place, this report will focus on key points raised by the participants. Since most of the discussions were oriented toward the Soviet Union, the first and largest segment of the report will be on Soviet activities. The remaining segments will deal with the impact of international law and the entry of lesser powers into the space arena. Finally, several general observations will also be presented.

## DISCUSSION

### Soviet Doctrine

The prepared questions included doctrinal queries tied to the time periods assigned to each roundtable. As the discussions developed, it became apparent that, due to the unique characteristics of Soviet military doctrine, time frame analysis was inappropriate. What emerged in the roundtables was a picture of a doctrinal perspective and system considerably different from that found in the United States. Because of the Soviet doctrinal approach, it was agreed that a separate "space doctrine" does not exist. Rather, Soviet space activities are guided by the extensive and pervasive general military doctrine which guides the rest of the Soviet military.

This doctrine was described as visible from two directions. The first is the interpretation of Soviet writings. The works of most value were identified as those relating to the Marxist-Leninist view of war and the extensive amount of Soviet military writing. The second source that provides insight into doctrine is the analysis of Soviet actions. A key aspect of both sources was considered to be the recognition that American perceptions cannot be transferred directly to the Soviet Union.

The Marxist-Leninist view of war was identified as a key element in understanding the Soviet approach to military power. Although difficult to summarize, this view includes a recognition of the inevitability of international conflict. This does not necessarily mean war; however, it does mean ongoing competition between the two social economic systems led by the United States and the Soviet Union. The competition includes the potential of conflict on any level, including war.

This ideological commitment allows the Soviets to call for the focusing of the total resources of the state at critical points in the conflict.

Acceptance of the state of conflict and recognition of the potential for conflict occurring on any level strongly influences both Soviet actions and Soviet doctrine. They feel that they must be prepared not only to fight at any level or in any medium but also to win.

Perhaps the most obvious difference between U.S. and Soviet military doctrines noted during roundtable exchanges is in the area of deterrence. It was pointed out that the Soviets do not subscribe to the American concept of nuclear deterrence. This does not mean that they desire war, especially nuclear war. It does mean that they practice a concept of war avoidance based on military strength.

During the discussions considerable emphasis was placed on doctrinal differences as important to understanding the Soviet mind set. The Soviet approach emphasizes power relations(correlation of forces in Lenin's term). It recognizes the pragmatic aspects of thinking about how to fight effectively if needed, even in a nuclear environment. The awareness of power relations includes the potential use of military power for intimidation when desired.

Under the Soviet view of international conflict, space must be considered a potential medium of conflict. Their view of war demands that they not ignore the potential of this arena and that they not surrender an advantageous position to the enemy. Space use should thus be viewed in concert with other programs designed to enhance national power in the pursuit of national objectives.

These concepts have been incorporated into the large body of writings generated by the Soviet military. These writings provide an extensive, well defined, all encompassing description of general military doctrine. These doctrinal concepts can provide a clear picture of the overall direction

and guidance of Soviet military forces; however, they must be carefully studied. In particular, the pitfall of "mirror image" analysis -- that is, projecting our own thought or self-image onto the Soviets -- must be avoided.

The doctrinal statements continue the Marxist-Leninist concepts of warfighting and war winning. Within this context, one important statement that always seems to receive great coverage is the desire to defend the socialist motherland. This undoubtedly provides doctrinal backing for defensive systems, including the massive air defense program (PVO Strany) and the controversial civil defense programs. It was suggested that this defensive attitude could justify heavy expenditures in the areas of antisatellite, antimissile, and other space related military activities.

The concept of defending the motherland emerges as a much broader directive in most Soviet military writings, an objective consistent with being able to fight and win at any level. Doctrinal statements tend to emphasize the offensive rather than the purely defensive approach to military operations. In this regard, it was observed that the Soviets have become technologically as well as tactically aggressive. The implications are that space systems and employment concepts must be pursued in support of the overall military doctrine.

This view is consistent with the Soviet doctrinal concept of combining various combat arms or forces. This is done to enhance the overall effectiveness of the combat elements within a given environment. Accordingly, Soviet space systems appear to have been integrated with the existing force structure under the general warfighting and war winning philosophy of the Soviet military.

During the roundtable discussions of Soviet "space doctrine" it was noted that due to Soviet secrecy the only available written material specifically reflecting official Soviet views on space doctrine is that provided in 1959 by Colonel Oleg Penkovsky. In spite of this, the consensus of the discussions was one of confidence in the use of what we know of overall Soviet military doctrine to understand the direction of the USSR's space effort.

It was also pointed out that the analysis of Soviet space activities can provide insights with respect to the direction of their programs. This technique tends to support the integrated view of the general doctrine. Indeed, three broad areas of militarily related space efforts seem to have emerged -- force enhancement, command and control, and force projection.

Soviet integration of space with the existing force and doctrinal structure is likely to continue in the future. Similarly, the Soviets can be expected to continue the pursuit of advances in space aimed at improving the power of the USSR and at enhancing its position vis-a-vis any potential adversary.

Developments and Objectives

The actual development and objectives of the Soviet space program seem to be consistent with the key elements of their doctrine. In particular, Soviet space activities seem to emphasize the role of space programs in enhancing Soviet national power, three dimensions of which are military power, national prestige and economic strength.

Military motivation was continually mentioned as one of the key driving factors behind the space program. It was noted, for example, that while *Sputnik had primarily a* prestige related effect, it was a spin-off of the missile program. The military use of space was generally described as related to the three categories identified in the doctrine discussion above -- *force enhancement, command and control, and* force projection.

The force enhancement area was identified as an important and very active part of the military space effort. It includes reconnaissance and surveillance support for the traditional services. This involves photography, radar reconnaissance, and Elint collection. These systems as well as command and control assets are considered to be very important in crisis management or combat support operations, as has been demonstrated in several examples such as the 1973 Middle East War and large scale naval exercises. Other important force enhancement missions are weather, navigation, and early warning.

Closely associated with the force enhancement concept is the area of command and control. It was noted that the heavily centralized Soviet command structure places considerable emphasis on effective command and control communications. Soviet use of satellite communications has grown to include the highly eliptical Molniya, geostationary satellites, and store-dump systems.

The expanded capabilities provided by space systems are particularly critical to operations away from the Soviet heartland.

The final military area of space operations was identified as force projection. This refers to the actual movement of a combat capability into space. This area generated considerable comment, although it was generally accepted that space has been, is, and will be viewed as a medium of conflict by the Soviet Union.

Early examples of force projection were the Fractional Orbit Bombardment System (FOBS) and the Antisatellite (ASAT) Program. The FOBS system is believed to be dormant, but the ASAT program now provides the Soviets with a capability against near earth targets. This system and its status provoked considerable discussion by roundtable members.

The first issue raised was the initial motivation for the program. One view put forward was that it was developed in reaction to the U.S. Saint ASAT program. This was countered by a comment that the Soviet ASAT program had its beginnings in the early 1960s with planning probably beginning in the 1950s. This was presented as evidence that the program was moving under its own power from the beginning and thus was not merely a reaction to U.S. efforts. Indeed, this internal motivation was identified as a demonstration of early Soviet recognition of the value of space.

Although this specific perception was accepted by roundtable members, some did question the value of the current system with its near earth altitude restrictions. Two responses to this were proposed. The first was the fact that reconnaissance platforms are the most likely near earth targets. Although this would provide strategic warning, it could reduce needed reconnaissance support during critical theater operations and potentially during strategic operations as well.

This employment concept was complemented by the view that current ASAT efforts are merely the first step. The discussion in this area referenced the probability of improved systems such as laser and particle beam weapons. The existence of ongoing research in these two fields was not disputed; however, the effectiveness of the programs was a matter of contention as will be discussed below. Finally, the likely follow on to an improved ASAT was identified as a Ballistic Missile Defense (BMD) Program.

The military orientation of the Soviet space program was also identified in manned operations. The Soviets appear to feel that man is a very important element of their space program as is suggested by their extensive efforts to establish long-term manned orbital platforms. Development of a military version of the Salyut space station and the presence of military pilots in "civilian" scientific missions are further evidence to substantiate the Soviet concept of a military role in space.

A number of roles were suggested for manned military operations. The most obvious was the performance of reconnaissance and surveillance missions. It was suggested that this could provide nearly real time responses without excessive levels of sophistication. Command and control type functions were also suggested as potential missions. In general, the Soviets were pictured as believing that manned systems have greater flexibility than heavily specialized, unmanned space platforms.

The emphasis on man in space was also carried over into the area of national prestige. The Soviet manned programs have continually been used to demonstrate the superiority of the socialist system. The first orbital flight (manned and unmanned), the first multiple manned flight, long term space operations, and many other efforts were cited as examples of how the Soviets

have effectively used their space program to enhance their international reputation. The use of cosmonauts from other nations was also noted as a particularly effective image making undertaking.

The results of these efforts have generally been very effective. The Soviets appear to have enhanced their position and influence in third world countries through their space activities. Perhaps more importantly, they have managed to create an image in the West of technical competence. This image has at times been so strong, the U.S. has been perceived as being behind, attempting to catch up. This image has even existed when the U.S. has actually been in the technological lead. This perception has often existed not just within the U.S., but in other nations as well.

The desire to demonstrate national capabilities is complemented by a strong Russian (and Soviet) tradition of supporting scientific research. Peter the Great was identified as one of the founders of this movement. In the case of space, the scientific orientation may also combine with an expansionist, exploration oriented national spirit that some observers compared to feelings in the United States. Writings on the exploration of space were reported during the 19th century Tsarist period.

The prestige motivation (augmented by scientific and exploratory cultural traditions) was considered to be the primary driving factor for certain types of programs; however, these efforts were always considered to be secondary to the military activities. Examples used to illustrate this include most of the deep space activities. The numerous lunar, Venus, and Mars missions would fall into this category. It was also pointed out that the Soviets had desired to conduct a manned moon program, but backed out of it to avoid embarrassment in the face of rapid American success.

The deep space missions combined with scientific, near earth activities demonstrate a strong Soviet scientific and technical capability. This capability, in the opinion of a number of roundtable participants, has reached the point where it is close to (and in some cases ahead of) the U.S. This is particularly true in the pure science areas. The roundtable discussions reflected the general opinion that his scientific parity or selective superiority had not been fully translated into operational systems because of limitations within the Soviet Union. Among the areas identified as restricting the application of scientific developments, the most critical is computer capabilities. This observation produced a warning that Soviet computer hardware is catching up, but that software remains a problem.

The question of technical competence produced observations on Soviet design philosophies. Roundtable discussions tended to emphasize the difference between U.S. and Soviet approaches. The general observations on U.S. systems indicated a desire to maximize sophistication and to build multimission platforms whenever possible. The Soviet approach was more closely associated with straightforward expediency. Although Soviet systems are frequently termed crude by U.S. standards, they normally are more than adequate in accomplishing the specific mission which they are designed to perform. Soviet platforms are considered to be simple, rugged, and effective, whether designed for military or scientific operations.

The scientific programs that operate in the near earth environment are generally considered to go beyond the prestige or purely experimental categories. If not directly linked to military programs, they are at least indirectly related to the military or tied to economic efforts. These economic programs are seen as a way to enhance the national power of the U.S.S.R.

A variety of missions were identified as having economic motivation. Earth resources were commonly used as an example. Ice surveillance of northern waters and ocean surveillance in support of the Soviet fishing fleet were also used to illustrate this type of program. The economic platforms were also said to be used to gain influence and enhance prestige through the sharing or sale of information or services.

The consensus view held by roundtable members of Soviet space operations, whether civil or military, is that these operations are directed toward enhancement of Soviet national power and improving the perceived position of the USSR within the world community of nations.

## Soviet Organization

The Soviet approach to organizing their space efforts was examined in all three roundtables. It was generally conceded that the extensive secrecy of the Soviet system inhibits clear understanding by outsiders; however, it was also noted that the overall space program reflects a considerable amount of foresight and planning. This impression of extensive organization was believed to be a reflection of high level direction of the scattered civil and military entities that contribute to the overall program.

This high level direction perhaps contributes to a relatively smooth and focused operation even without a specialized, dominant organizational entity. It also has significant implications for specific space activities. Due to the long term tenures of Soviet leaders, their interest ensures program continuity. This generally means that once a decision is made to proceed with a project, it will receive the required resources, manpower, and funds.

A key factor accounting for the high level interest in space programs is the engineering or industrial background of most Soviet leaders. This was contrasted with the tendency toward liberal arts education in the American leadership ranks. Although several examples were given, Defense Minister Ustinov emerged as the prime example of an individual near the top who has spent a major portion of his career involved in engineering programs. In Ustinov's case, this also involved working with the early space program.

With this high level interest and direction, but without a single, "umbrella" organization, the Soviet space program has apparently emerged with a collegial approach to coordinating various efforts. A relatively small number of top scientists and interested military organizations all work together within

the framework of top level guidance. This collegial approach generally follows two tracks -- civilian and military.

The civilian space activities are dominated by the Academy of Sciences. This strong organization is often the focus of Soviet prestige and pure science space programs. Several roundtable participants referrenced a NASA type organization within the USSR. However, it was described as being much less powerful and pervasive than its American counterpart.

An important aspect of the civilian community is the extensive research and development (R&D) program. This is a wide ranging effort that is very important to maintaining the progress of the Soviet space activities. It includes such aspects as 32 "science" cities dedicated to the advancement of science. These R&D efforts are often very closely linked to the military and military related needs.

The military appears to be the dominant organization within the overall space program. It has considerable responsibility for a variety of activities. Within the military, however, it was pointed out that no single command has emerged as the controlling entity for space.

Individual military or military related organizations appear to have assumed responsibility for space activities that overlap with their existing areas of operations. For example, PVO Strany (air defense of the homeland) apparently has responsibility for defensive systems. This included the particle beam and laser systems. The Strategic Rocket Forces are believed to be the primary managers of launch platforms.

This conglomerate of entities may seem to differ from the heavily centralized and intensive planning common within the Soviet system. It does, however, appear to be the way the space program has evolved. It has probably been successful because of intense upper level interest that serves to focus activities at lower levels.

## Future Soviet Activities

The consensus of the roundtable discussions was that the Soviet space program will continue to receive considerable emphasis in the future -- not just as a continuation of existing activities, but also with expansion into new areas as quickly as possible. The future should continue to see the dominance of the military towards the objective of expanding Soviet national power.

The driving factor for military space efforts will likely continue to be current military doctrine. It was doubted that a separate, specifically space oriented doctrine would emerge. Likewise, it was doubted that a special command for military space operations would soon be formed. On the other hand, some participants felt that over the long run (perhaps 15-20 years), space would emerge as a separate command similar to the SRF. This was considered to be highly unlikely by other participants unless a significant combat role emerged.

Some members of the roundtables felt that the development of combat operations in space will occur in the very near future. Many seemed to feel that the Soviets have already recognized and are committed to the exploitation of space as the next significant combat arena. Related directly to this was the hypothesis put forward that the Soviets would like to exploit their extensive R&D program to leap ahead of the U.S. in space capabilities. The objective would be to gain superiority in space.

The existing ASAT program as well as the laser and particle beam R&D efforts were cited as examples of this combat orientation. Roundtable members tended to agree that high energy laser (HEL) systems were the next operational step. ASAT capabilities are expected to emerge first, followed by BMD development. Particle beam technology created more debate in terms of its potential value.

The extensive Soviet particle beam R&D effort was generally accepted; however, sharp differences emerged concerning its potential in actual operations. One view was that it could be the significant breakthrough that will give the Soviets superiority in space and a potential strategic advantage. This view was bolstered by comments on the extensive expenditure of resources currently being devoted to this area. Additionally, it was charged that American scientists are being chauvinistic in categorically denying that the Soviets could develop a particle beam system when it is considered impractical or impossible in the U.S.

This brought a sharp response from some of the participants. They felt that the particle beam concept had been studied sufficiently and that it was unlikely to be developed successfully in the foreseeable future. Many seemed to feel that even if the concept were within the realm of physical possibility, it is unlikely that the Soviets would be able to surmount the numerous problems associated with fielding an operational system.

This debate did not detract from the general agreement that the Soviets are pushing forward in expanding their combat potential in space. Several additional areas of concern were surfaced in this regard. Specifically, electronic warfare, environmental disruption, and the use of manned systems were referenced as future challenges.

The Soviet concept of electronic warfare is termed Radio-electronic Combat (REC). REC is an integral part of all Soviet combat plans. It is highly probable that this will be transferred to space operations. If normal REC concepts are followed, at a minimum, efforts will be made to disrupt space based communications links. REC concepts would also require an effort to destroy space based communications and electronics platforms. Additionally,

the Soviets can be expected to attempt to interfere electronically with all susceptible U.S. space systems. This activity will include attempting to intrude and gain control of critical U.S. satellites. The primary concern over the impact of REC was the effect it would have if U.S. forces were not prepared for it.

The prospect of environmental disruption was also raised during the discussions. Little was said to clarify this area beyond an indication of Soviet interest. The only specific comment indicated concern over ionospheric disruptions. It was noted that the potential impact of environmental shifts is too awesome to be ignored.

The roundtable discussions concluded that along with the technical missions described above, the Soviets would also continue to use man in a military space role. No new missions were identified for manned operations beyond those already noted in the contemporary section. The use of man in military operations was seen as primarily linked to flexibility in operations. Moreover, the use of man appears likely to grow as space operations become even more important.

The expansion of manned activities is also associated with nonmilitary space missions. Both military and nonmilitary missions will likely be characterized by long duration flights. It was noted that this has already been an important part of Soviet manned flights. Systems development will be aimed at supporting these long duration missions.

Large space structures will eventually be placed in orbit for manned use. Initially, the Soviets may use multiple formations of Salyut space stations; however, these will eventually give way to a large specialized station.

These larger systems will probably not appear until the Soviets perfect a large launch vehicle, probably in the Saturn class.

In the short term, Soviet manned programs will continue to be supported by the Soyuz capsule. As the manned space activities expand, they will probably move to a reuseable transport system. The roundtable discussions concluded that while this would probably be similar to the American shuttle, it would be more oriented towards moving personnel rather than equipment. Because of this, the Soviet shuttle will likely be smaller than its American counterpart, serving to complement rather than replace existing launch systems.

The Soviet manned program will probably move to make space an economically viable environment. An effort to use the expected large structures in this way is expected. The current zero gravity fabrication experiments on the Salyut missions were cited as indicators of an eventual industrial program in space. Although not necessarily tied to the manned operations, it appears that one of the critical economically oriented space programs will be energy production.

The more purely science and prestige related activities will also be continued. The need to demonstrate Soviet (or socialist) superiority will remain a key motivator. Deep space activities will also continue. This may even expand to include an attempt at a manned trip to Mars by the turn of the century.

The overall appraisal of the future of the Soviet space program was that it will be extensive and aggressive. The military role will dominate, but the economic and prestige related programs that contribute to national power will also be important. The discussions indicated that the only

thing that can inhibit rapid Soviet growth in space is the economic reality that exists in the USSR. The problem of limited resources could slow down the space effort, although many seemed to feel that cuts would be made in other areas first because of the recognized importance of space. The space program will be a critical part of Soviet efforts to influence both major and minor states throughout the world.

## International Space Law

The roundtable discussions on international space law tended to focus on U.S. and Soviet competition and the impact of the legal structure on this competition. Existing legal restrictions were briefly discussed. This quickly moved into discussions of U.S. and Soviet approaches to space law and its development. The military role in the legal process drew considerable attention.

The symposium discussions identified a number of areas in which legal developments specifically affect military operations. Nuclear and other weapons of mass destruction may not be placed in full earth orbit, installed upon celestial bodies, or otherwise stationed in outer space. Nuclear devices may not be detonated in outer space. The environment of Earth or outer space may not be modified for hostile purposes. Space based, anti-ballistic missile systems are prohibited. Nations may not interfere with satellites engaged in arms control agreement verification activities. It is forbidden to establish military bases, installations, or fortifications upon the moon or other celestial bodies or to conduct military maneuvers of weapons tests thereon. Finally, outer space is subject to the U.N. Charter, which prohibits the threat or use of force against another state except in self-defense. That qualified prohibition would logically extend to the threat or use of force against another state's space object.

Existing laws and treaties that have created these restrictions were described as being relatively soft and ineffectual in many ways. It was also noted that they may grow stronger with time. The major concern expressed in the legal area is the potential for overly rigid laws restricting the development of necessary operational capabilities. It was noted that international space law, as with most international law, depends on the support of the

affected nations to be of any value. Several participants stated that this tends to place the U.S. at a disadvantage due to our general attitude toward law. The American approach was described as fully embracing both the letter and the spirit of the law. This was described as being carried out to the extent that programs believed to be too close to the edge of a legal restriction are often not pursued in the interest of avoiding the perception of quibbling with the law.

This American attitude was described as potentially dangerous. This concern was voiced in relation to the potential restriction of critical operational developments in order to avoid appearing to tread near the edge of an existing or pending law. The concept of the spirit of the law was cited as a very restrictive element in this area.

An example of this was seen in the discussion of the effect of the Anti-Ballistic Missile (ABM) treaty. Some discussants felt that this could inhibit the development of advanced Ballistic Missile Defense (BMD) systems. Others felt that any restriction of the advanced BMD programs would come only from interpretation of the spirit of the ABM treaty. These people read the ABM treaty as having no specific restrictions against the development of advanced BMD capabilities.

This example also opened the question of differences between the U.S. and the USSR in the use of international law. The U.S. approach was said to be tied to the spirit of the negotiations and, therefore, it tends to be more strongly attached to the spirit of the law. It was also asserted that the operational military is not sufficiently consulted in the development of treaties and laws. This creates potential problems with overly rigid restrictions and frequently leads to long term problems.

The Soviets were identified with a more sophisticated or at least a more pragmatic approach. Soviet negotiating techniques tend to focus on creating a legal environment that suits their needs. Inherent in this is avoiding treaty commitments that restrict specific programs they are developing or are planning to develop. They will, however, accept restrictions they perceive to be in their long term interest.

The acceptance of certain restrictions was veiwed as part of the Soviet perception that space activities are a state prerogative. Several comments indicated that because of this the Soviets would like to limit private space ventures unless licensed and controlled by states. On the other hand, it was also pointed out that the Soviets do not like to accept responsibility for damage caused by their own reentering equipment.

The Soviet military was identified as a key participant in the negotiating process. This demonstrates, once again, the primary role of the military in space operations. It also provides some assurance that treaties or laws will not directly interfere with operational programs. The discussions also indicated that the Soviets may use negotiations to hinder U.S. programs they wish to slow down or stop.

The general feeling of the roundtables was that the U.S. military must gain a greater role in the negotiating process. This view was based both on the success of the Soviet approach and on the recognition of problems that have developed in the past. This was not intended to place the military into the policy making position, but rather to make it more effective in its advisory capacity.

In addition to U.S.- Soviet legal questions, roundtable discussions produced warnings in two additional areas. Both areas may eventually create problems

for both civilian and military space operations. The most immediate problem is radio frequency distribution; the other problem is the allocation of geosynchronous orbit positions.

The radio frequency debate is already becoming serious in international circles. The less developed countries in particular are demanding a share of frequencies. This could severely restrict the channels open to major power use. It may also eventually lead to a debate between military and civilain users over the distribution of available frequencies.

The geosynchronous orbit question is a two-fold problem. The most direct challenge to geosynchronous orbit positions is the territorial claim by equatorial states that lie under the orbital locations. This has largely been ignored by the major powers that are operating on the concept of free use. Some voiced concern that this precedent could become challenged when enough nations become involved in space operations.

The expansion into space will also produce competition for the finite number of geosynchronous orbit positions. The minor powers and third world states may use the precedents of frequency assignment and the law of the sea to demand their share of positions. This may create a significant reduction in the number of orbits available to the U.S. As with frequencies, this could result in civilian and military competition and would definitely demand better planning of future geosynchronous programs.

The most important conclusion of the international law discussions was the need for the military planners and operators to be aware of the potential impact of international law on their use of space.

## International Activities

The roundtable discussions on international activities tended to fall into two general categories. The first emphasized the ongoing or expected activities of the non-U.S. and non-Soviet space programs. The second involved the impact of U.S. and Soviet space programs on the international arena.

The space activities described in this area were generally related to European, Japanese, or Chinese programs. It was recognized that other nations (e.g. India and Indonesia) are involved in space, but it was felt that the major efforts would come from these three areas. The general statements tended to indicate that the interest of the lesser powers was primarily economic and nonmilitary in nature. A possible exception may be the People's Republic of China which may attempt to use space to help improve its military posture vis-a-vis the Soviet Union.

Several areas are likely to be emphasized in the space activities of the lesser powers. The use of space based communications has already been established as an important space function. This can be particularly important to the modernization programs of smaller states. The geosynchronous requirements of expanded communication nets will hurry the problems described in the international law section.

The two more directly commercial areas are earth resources and energy production. The earth resource systems are critical to locating additional natural assets needed to support contemporary societies and economic systems. Space based energy production may offer at least a partial solution to the depletion of fossil fuel resources. The Japanese are reported to be particularly interested in this area.

While the systems described in the international arena were distinctly commercial in nature, several roundtable participants voiced concern that

these capabilities would lead to a spread into the military side. The systems will contribute to national economic power and may provide the individual states with some international leverage. Additionally, it was noted that many civilian space programs have potential military applications. The examples of using maritime satellites for naval support or using earth resource satellites for intelligence or targeting were mentioned.

The view was also advanced that commercial involvement in space will directly lead to a military involvement. This was felt to be particularly true as the value of space increased for a given country. The example of the British fleet was presented as a supporting analogy. The point was that the British did not develop a fleet just to have a fleet. Rather, they developed their maritime military power to support their wide ranging commercial interests.

A more specific military development was also surfaced during the discussions. It was pointed out that any nation possessing a launch vehicle also could have a long range missile. This was of particular concern in the case of the ORTAG launch vehicle program. The test facilities for this West German commercial development are located in Libya. The location of this effort (not to mention future expansions of other launch capabilities) raises the specter of radical or relatively unstable nations and leaders gaining control of a significant combat capability.

In addition to the international developments described above, the round-table participants discussed the use of space in the international arena by the major powers. The previous sections on the Soviet space program have highlighted the importance of this area to the USSR. Space accomplishments are used to demonstrate the progress of the socialist system. Additionally,

the Soviet space program is used in both direct and indirect ways to gain influence in the Third World.

The U.S. space program has had similar uses; however, the American government has been less aggressive in using the space program as an instrument of power and influence. This probably stems from a different world view than the Soviet image of continuing conflict. The roundtable discussions emphasized the need to recognize this conflict in views and to incorporate it as part of our policy and planning process.

The need for the military to appreciate the political and commercial aspects of space was also emphasized. The U.S. military must understand that the broad context of U.S.- Soviet competition also includes non-military dimensions. Moreover, the potential for contributions by our allies may become critical to the military balance in the not too distant future. This is especially true when the military capabilities of the commercial programs are evaluated and added to America's own programs.

General Issues

The roundtable discussions on panel three produced exchanges on several areas not directly related to its charter. Nevertheless, the material discussed related to American doctrine and to the strategic balance of forces and thus will be reported in this additional section.

The first critical point, which has already been touched on earlier, is the need for the U.S. to recognize the differences between American and Soviet world views. Although it was noted that mirror imaging is not the problem it once was, decision makers must avoid attempting to analyze Soviet actions through American eyes. For the military it is particularly important to gain an understanding of Soviet military doctrine and to appreciate its ties to politics and other forms of national power.

This better understanding of the Soviets must then be transferred to U.S. doctrine and equipment procurement. This requires the development of an American doctrine that will provide clear guidance in the formation and employment of U.S. military forces. Only with this clear guidance will we be able to create an efficient combat force without wasting resources. Finally, the key to accomplishing this was identified as improved cooperation between intelligence, operational, and research and development agencies.

The discussion of doctrine and its problems turned to current U.S. strategic doctrine. It was pointed out that U.S. doctrine emphasizes deterrence while the Soviet Union does not accept this concept per se. This was cited as a dangerous situation in light of current improvements in Soviet war-fighting capabilities and the American program cutting philosophy of the recent past. Several doctrinal and technological solutions to this problem were described.

The simplest and cheapest proposal was a suggested doctrinal change. This change was aimed at the concept of Mutual Assured Destruction (MAD). It was first observed that the MAD doctrine is only valuable if both sides subscribe to it; however, the Soviets do not. It was also pointed out that current U.S. plans in support of MAD call for riding out the first strike and then retaliating with sufficient force to inflict unacceptable damage on the USSR. Improved Soviet capabilities may now provide them with the ability to destroy enough of the American strategic force to allow them to think about the possibility of a successful first strike.

The discussions indicated that the key to deterring such a Soviet strike is to create doubt in the Soviets' minds over the probability of success. Based on this, it was suggested by some that the doctrine be modified to one of launch on attack (LOA) or warning. Under this concept, U.S. retaliatory forces would be launched as soon as a Soviet attack were detected enroute to the U.S. This would create significant doubt in the Soviets' minds over the value of an attack, but it was also viewed by others as dangerous and overly dependent on perfect warning and command and control.

The roundtable discussions included the recognition that the factors described above led to the proposal for the MX program. In general, however, there appeared to be very little support for the MX "shell game" plan currently being developed. The primary concerns appeared to be over the massive drain of defense funds this program would demand. Because of this problem, several alternatives were proposed.

One such proposal included the use of the MX missile, but not in the shell game configuration. This approach suggested launching the MX into orbit rather than into a ballistic trajectory when an attack is detected. The

system could then be deorbited when the attack is confirmed. This would reduce prelaunch vulnerability, but would pose other significant technical and legal problems.

The proposals on ensuring a continued offensive capability focused on pursuing an active defense, rather than passive protection or changing launch options. While not as cheap as the LOA proposal, it was stated that new defensive technologies could perhaps create a stable strategic environment for lower capital expenditures than the other proposals. It was also suggested that long term benefits would be greater with the advanced technology systems.

These advanced systems were to be largely space based, although aircraft basing was mentioned as a possibility. The weapons suggested were either lasers or particle beams. As with the discussion of Soviet advanced programs, HEL systems were felt to be available for operational deployment in the near future. Particle beams were felt to be a considerable time away from potential use even after (or if) they are proven to be technologically feasible.

The consensus of the roundtable appeared to be that the best approach for the U.S. to redress the shift in the strategic balance was actively to pursue space based, advanced technology, defensive systems. The major caution to this was the observation that no solution is without risk, and that the key to any program is for the enemy to believe in its capability and in the American will to use it. It was also noted that it would be dangerous to focus on any one system. The entire force structure must be evaluated and its overall combat capability must be the basis of any decisions.

The final area of concern raised by the roundtable participants was that of technological transfers. The consensus of the discussions appeared to

be that U.S. technological transfers have significantly added to the growth of Soviet military capabilities. The areas of fabrication (e.g., ball bearings) and computers were cited as particularly important factors. The observation was also made that the short term advantages of technological sales to the PRC may come back to haunt the U.S. over the long term. To diminish the impact of these problems it was suggested that the Department of Defense should be the primary agency in control of technological transfers as the Commerce Department is more concerned with the balance of payments than with national security.

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# Appendix

Appendix 1

ACRONYMS

| | |
|---|---|
| ABM: | Anti-Ballistic Missile |
| ADC: | Aerospace Defense Command |
| AFCC: | Air Force Communications Command |
| AFLC: | Air Force Logistics Command |
| AFM 1-1: | Air Force Manual 1-1 |
| AFM 1-6: | Air Force Manual 1-6 (draft space doctrine) |
| AFSC: | Air Force Systems Command |
| AFTEC: | Air Force Test and Evaluation Center |
| ARPA: | Advanced Research Projects Agency |
| ASAT: | Anti-Satellite |
| BMD: | Ballistic Missile Defense |
| $C^2$: | Command and Control |
| $C^3I$: | Command and Control Communications and Intelligence |
| CEP: | Circular Error Probable |
| DCA: | Defense Communications Agency |
| DD 5160.32: | Department of Defense Directive 5160.32 |
| DOD: | Department of Defense |
| ELINT: | Electronic Intelligence |
| FOBS: | Fractional Orbital Bomb System |
| GHQ, AEF: | General Headquarters, Allied Expeditionary Forces |
| GPS: | Global Positioning System |
| GRU: | Soviet Military Intelligence and Security |
| HEL: | High Energy Laser |

| | |
|---|---|
| ICBM: | Intercontinental Ballistic Missile |
| KGB: | Committee of State Security |
| LOA: | Launch on Attack |
| MAD: | Mutual Assured Destruction |
| MAJCOM: | Major Command |
| MX: | Missile Experimental, follow-on ICBM (U.S.) |
| NACA: | National Advisory Committee for Aeronautics |
| NASA: | National Aeronautics and Space Administration |
| NAVSTAR PPS: | Navigation Satellite |
| OPR: | Office of Primary Responsibility |
| PD/NSC-37: | Presidential Directive #37 |
| PD/NSC-42: | Presidential Directive #42 |
| POM: | Program Objective Memorandum |
| PPBS: | Program Planning Budgeting System |
| PRC: | People's Republic of China |
| PVO Strany: | Soviet Air Defense Command |
| R&D: | Research and Development |
| REC: | Radio-electronic Combat |
| RORSAT: | Radar Ocean Reconnaissance Satellite |
| SAB: | Scientific Advisory Board |
| SAC: | Strategic Air Command |
| SLBM: | Submarine Launched Ballistic Missile |
| SRF: | Strategic Rocket Forces |
| STS: | Space Transportation System (Shuttle) |
| TAC: | Tactical Air Command |
| TOA: | Table of Authorization |
| USAF: | United States Air Force |



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